

**A Model-Based Team Decision-Making and
Performance Assessment Instrument:
Development and Evaluation
Volumes I and II**

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A Model-Based Team Decision-Making and Performance Assessment
Instrument: Development and Evaluation

Volume I

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Introduction

This evaluation study represents one part of a project sponsored by the Army Research Institute. The goal of the project is to derive a model to guide the evaluation of team performance. The purpose of this article is to describe a model-based performance measurement instrument that has been designed to assess and diagnose team skills and to describe the findings of an initial evaluation of that instrument. Version 2.0 of the Advanced Team Decision Making (ATDM 2.0) model (see Thordsen, Klein, & Kyne, 1994) served as the basis for the instrument.

ATDM 2.0 is a cognitive model of team performance in that the metaphor underlying the model is that of individual cognition. The model views a team as an intelligent entity, capable of learning and adapting, making decisions, reacting to surprises, and planning and executing. The ATDM 2.0 model describes four components of team performance: team resources, team identity, team cognition, and team self-management. Each of these components is divided further into behavioral dimensions.

The model is a general one in that it is not domain bound, but applies to teams functioning in virtually any domain. This flexibility is achieved by organizing the model into four tiers. The two highest tiers (illustrated in Figure 1) represent the general components and behavioral dimensions of team decision-making and performance. These two levels describe aspects of proficient team decision-making and performance, regardless of the domain. In contrast, the two lowest tiers of the model, the specific behaviors and anchors, are specific to any one domain. These are the specific observable behaviors that are indicative of either good or poor performance for each of the behavioral dimensions. Only the upper two tiers (Team Components and Behavioral Dimensions) of the model are diagrammed in Figure 1. The lower two tiers cannot be represented in the diagram since they vary depending upon the domain of interest.

One purpose of the ATDM 2.0 model is to inform us about team processes. But more importantly, it is intended to serve as the basis for diagnosing team processes and for developing interventions that will enhance team performance. To meet these goals, it is essential to have the capability to assess and diagnose team processes as the team trains and functions within its operational setting. Thus, the objective of this portion of the project was to develop a draft team performance measurement instrument based on the ATDM 2.0 model and to evaluate the utility of the instrument in a field setting. This paper describes the results

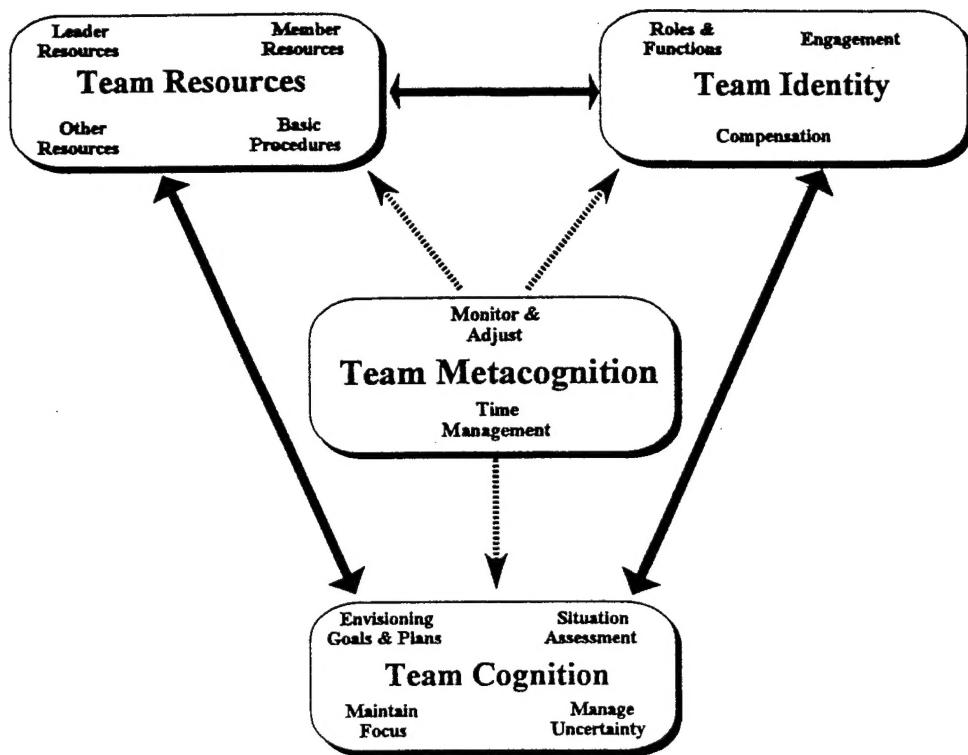


Figure 1. Advanced Team Decision Making Model, Version 2.0.

of this work: how we developed the measurement instrument, how we evaluated the instrument in a field study, and finally our conclusions and revisions to the instrument based on the findings of the field study.

Instrument Development

The two upper tiers (Team Components and their Behavioral Dimensions) of the model are descriptive of teams in general, i.e., they are not domain specific. However, the lower two tiers (Specific Behaviors and their Anchors) serve as a bridge between this general description of teams and specific teams in specific domains. If we can identify the Specific Behaviors and Anchors for a particular team, we have the basis for an assessment instrument. This instrument can then be used to measure and evaluate aspects of the team's decision-making and performance. In this section we will describe how we used the upper generic tiers of the model to guide us in identifying the specific behaviors and anchors for a particular domain and how we then used these specific behaviors and anchors as the basis for an assessment instrument.

We established several criteria or goals for a successful assessment instrument. Obviously, we wanted to develop an instrument that could be implemented reliably by

researchers and experienced domain personnel. In addition, we wanted to ensure that the instrument was sensitive to changes in team performance. We also established several functional requirements for the instrument. First, the instrument had to be flexible so that it could be adapted from one domain to another relatively easily. Second, we wanted an instrument that could be handed off for use by domain personnel. We wanted the instrument to be used by people sophisticated in the domain, and not just by the people involved in the model development. Finally, the instrument had to be useful for identifying the strengths and weaknesses of teams as they performed their jobs in operational settings. We considered these goals throughout the development process and used them as criteria when designing the evaluation of the instrument.

As described by Thordsen, Klein, and Kyne (1994), the two higher tiers of the ATDM 2.0 model are general. The components and behavioral dimensions describe key elements of team performance in many domains. To apply these concepts usefully in a given domain, we must identify specific behavioral examples of how team performance is instantiated in the domain. The model must be anchored in the domain. What constitutes good and poor performance on each of these dimensions and components within the domain? These examples or anchors are at the core of the performance measurement instrument. Therefore, identifying specific behavioral markers was the key to the development of the instrument.

Our initial efforts at developing an instrument focused on the Army's battalion battle staff. This is a large, diverse team that performs both planning and execution functions under conditions of ambiguity, time pressure, and high risk. In addition, the team has an overt hierarchical command structure. Our goal was to identify specific behavioral markers related to team proficiency that indicated good and poor performance on each of the behavioral dimensions and components. Our criteria were for these markers to be observable and to serve as indicators of the quality of team performance for experienced observers.

To identify these markers, we enlisted the support of two domain subject matter experts (SMEs). These SMEs had served as battalion commanders and had significant active duty experience with battalion and brigade battle staffs. Researchers conducted numerous extensive interviews with each SME to elucidate the ATDM 2.0 model and to elicit information about the battle staff's tasks and indicators of performance quality. As the model took shape, the SMEs were asked for comments and suggested revisions. As such, the SMEs helped shape the ATDM 2.0 model as well as identify behavioral markers. This process resulted in a detailed listing of behavioral markers that represented effective and ineffective battle staff performance for each of the behavioral dimensions incorporated into the model. These behavioral markers bridged the model to the battle staff domain. The specific behaviors for each behavioral dimension are included in attachment A of this document.

We had planned to conduct the field study with Army Battalion battle staff during training exercises at their home stations and then again at the National Training Center, Fort

Irwin, CA. This would have given us the opportunity to test the instrument's capability for detecting change in team performance as the battle staff gained experience. Because we were unable to secure access to these test sites, we switched to the Incident Command Structure of the firefighting domain.

The early development of the model and the measurement instrument with the battalion battle staff served as a template for the measurement instrument to be evaluated in the field study using urban firefighting teams. We believe that there are certain similarities between battle staffs and firefighting teams. For example, both teams execute plans under time pressure, ambiguity, and high risk. Furthermore, both types of teams employ hierarchical command structures. Therefore, we simply needed to revise the behavioral markers to establish a set that is valid for firefighting teams and to create a useable format for the instrument.

To accomplish these goals, we conducted a pilot study in an urban fireground setting. Two researchers each spent six days with the fire department of a large U.S. city. They accompanied nine Battalion Chiefs (BCs) on a total of 20 incident calls. Using the revised instrument, researchers observed the firefighting teams in action and interviewed the BCs and other members of the teams both during and after the incidents. The pilot study gave researchers the opportunity to determine the similarity and relevance of the instrument's markers and whether it could be used easily in this setting.

Several interesting findings emerged from this pilot study. First, the 13 behavioral dimensions that make up the 4 team components of the current ATDM 2.0 model appear to be domain independent. That is, they represent critical elements of team performance across domains. The researchers did not recognize any team components or behavioral dimensions as inappropriate for this domain. In fact, when BCs described what they considered to be important factors for their teams, these factors matched many of the behavioral dimensions of the ATDM 2.0. Every dimension was mentioned in one way or another by the BCs.

A second finding of the pilot study was that performance on the various dimensions was easily observed by the researchers. The BC's vantage point offered a clear view of the team's performance. The researchers' challenge was to remain alert for the more subtle behaviors and not to get blindsided by the obvious ones. Because of the BCs level of domain expertise, they were able to point out the subtle behaviors as researchers implemented the measurement instrument.

Finally, many of the BCs volunteered to help revise and edit the descriptions of the behavioral dimensions and the supporting list of behavioral markers. We submitted several iterative versions of these items to the BCs for their feedback. This resulted in a list of

behavioral markers for each dimension that were meaningful for the intended users of the instrument.

The Instrument

The instrument is designed to allow an independent observer or a knowledgeable team member assess and document how a team performed during a specific incident. This version of the instrument is intended for use by Battalion Chiefs (BC) in urban fireground settings. The fireground team includes those under the command of the BC as the team responds to emergency calls. The composition and size of the team depends on the specific incident. The team may respond to a wide variety of situations including various types and sizes of fires, automobile accidents, police assistance, and gas and chemical leaks.

The instrument requires the observer to provide subjective ratings of team performance at the level of behavioral dimensions specified by the ATDM 2.0 model. The observer completes the ratings either as the incident evolves, if time permits, or after the incident when the observer has time to reflect on what occurred.

The instrument comprises two sections. The first is a single page on which the observer records his/her ratings for a single incident (see Figure 2). Note that this particular version of the instrument reflects the behavioral dimensions employed during the pilot study and as such contains 17 rather than the 13 of the current version. In the latest version, Range of Factors and Time Horizon are treated as sub-dimensions of Team Focus; Diverge and Converge are sub-dimensions, along with Size Up, under the dimension of Situation Assessment; [envisioning] Course of Action is now consolidated within Envisioning Goals and Plans; and Expectancies is addressed as special cases of either Situation Assessment or Managing Uncertainty, depending on the context. This first page contains space to record information about the original 17 behavioral dimensions. The observer provides two types of information for each dimension. First, the observer indicates whether behavior indicative of the specific dimension was observed, absent, not observed, or not applicable during the incident by checking the appropriate box. The observer checks the "Present" box if s/he observes behavior indicative of a specific dimension. The category "Absent" is reserved for those cases where the observer is sure that the behavior would have been applicable, but did not occur. "Not Observed" indicates that the behavior may have occurred, but the observer did not see it or is not sure.

The second type of information provided by the observer is a subjective rating of the quality of team performance for those dimensions and components that are positively observed during the incident. For this purpose, the observers used the rating scales in the right column of the page (see Figure 2). These scales are 5-point rating scales with a scale value of one anchored to "Very Ineffective," and a scale value of 5 anchored to "Highly Effective." The observers were instructed to use their experience and knowledge of the ATDM 2.0 model to arrive at these ratings.

Date: _____ Time: _____ Coder: _____ Incident #: _____

Incident Type: _____

| Behavioral Dimensions | P | A | n/o | n/a | L | —> | —> | —> | H |
|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|---|----|----|----|---|
| Member Resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Leader Resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Other Resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Procedures | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Roles & Functions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Engagement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Compensation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Envision Goals | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Range of Factors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Time Horizon | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Manage Uncertainty | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Diverge | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Converge | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Course of Action | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Expectancies | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Monitor & Adjust | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |
| Time Management | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 2 | 3 | 4 | 5 |

Figure 2. Rating scales.

The instrument also includes a second section which provides support for the observer as s/he observes team performance and completes the rating scales. This section serves as a quick reference guide for the behavioral dimensions of the ATDM 2.0 model. Grouped by component, each behavioral dimension is allotted one page which is tabbed for easy access. This page provides a definition of the dimension with descriptions of indicators of effective performance and space for the observer to take notes. The observer can refer to these descriptions before, during, or after an incident. This facilitates reliability among observers

and for one observer across different incidents. The information presented to the observer in this section of the instrument is in Attachment B of this report.

The Field Study

With the draft measurement instrument in hand, our next step was to evaluate it in an operational setting. The objectives of this field study were to determine the reliability, useability, and acceptance of the draft instrument within the constraints of an operational setting. We conducted this study with the cooperation of the fire department of a large U.S. city, the same fire department that supported the pilot study and instrument development. Note that for the field study, the instrument contained 16 behavioral dimensions with the earlier dimensions of Diverge and Converge being handled as sub-dimensions, along with Size-up, of Situation Assessment.

Two researchers accompanied a total of 10 BCs, six of whom had participated in the pilot study, two had not. We rode with the busiest Battalions and accompanied BCs who were on the busiest shifts. We observed a total of 36 incidents. These incidents were response calls to a variety of emergencies including fires, assist police, and automobile accidents. The teams ranged in size and composition depending on the nature of the emergency. Some teams included a single response unit such as a rescue unit and the battalion chief. Others were multiple alarm fires that included more than one company and, in some cases, more than one battalion.

The researchers, situated in the fire house, responded to calls with the BC. They remained with the BC throughout each incident. The researchers queried the BC and his aide during the course of each incident, monitored radio communications, observed team members' actions, and interviewed team members (including the BC) following each incident. In addition, each researcher completed a rating form and took comprehensive notes for each incident. To the degree possible, they completed the rating scales as the incident evolved; in some cases, they completed the scales following the incident. The researchers arrived at their ratings independently; they did not collaborate while completing the rating scales.

The ratings provided by the researchers posed an opportunity to assess the reliability among raters who are intimately familiar with the ATDM 2.0 model and team performance in other domains. However, it did not provide an opportunity to assess whether the BCs saw the incidents in the same way as the researchers or whether they would apply the instrument in the same way as the researchers. To answer these questions, we asked the BCs to complete a rating form for each of the incidents in which they participated. These ratings were provided after the incidents had occurred. The reason for this was to use these incidents to instruct the BCs on the behavioral dimensions. Talking to the BCs about the instrument during real-world incidents was the most efficient way of getting the BCs prepared to use it. The BCs were provided written descriptions of each of the incidents as well as a measurement instrument. They completed the rating forms independently. With

these data, we assessed the inter-rater reliability among the BCs and the two researchers for each of several selected incidents. These data are described below.

Reliability between researchers. For each incident, the measurement instrument asked the observer to make an initial judgment about each behavioral dimension. The observers indicated one of four categories:

- Observed: whether they observed behaviors indicative of the dimension
- Absent: whether the behavior should have occurred, but did not
- Not Observed: whether behavior might have occurred, but they did not observe it
- Not Applicable: whether the dimension was not applicable for the particular incident.

Neither of the two researchers used the categories "Absent" or "Not Applicable" to describe the 16 behavioral dimensions for any of the 36 incidents. Both researchers indicated that the dimensions were either "Present" or "Not Observed." To assess inter-rater reliability for making these categorizations, we calculated the percent of agreement among the two observers. For each behavioral dimension, the frequency of agreement among the two observers was divided by the total number of opportunities to agree (36). Table 1 presents these data.

Generally, there was good agreement among the two researchers about their categorizations. The percent agreement across all dimensions and incidents was 83.1%. However, there was variability across the various dimensions. Clearly, the highest agreement among the two observers concerned the four dimensions of Team Resources and the dimension Roles and Functions under Team Identity. There were no disagreements among the observers for these five dimensions. The least agreement occurred for the dimension Course of Action (52.8% agreement) followed by Range of Factors (58.3% agreement).

Another interesting point concerns the pattern of disagreements among the two observers. Since neither observer used the categories "Absent" or "Not Applicable," disagreements occurred only when one researcher indicated "Observed" when the other indicated "Not Observed." In 77% of these disagreements, Researcher 1 indicated "Observed" and Researcher 2 indicated the reverse. This suggests that the two researchers were systematically applying different sets of rules for making the categorizations. See Table 2 for the number of incidents each researcher observed a specific behavioral dimension.

Table 1

Percent Agreement Among Two Observers

| <u>Dimension</u> | <u>Number Disagreements</u> | <u>% Agree</u> | |
|-----------------------------|-----------------------------|----------------|---|
| Member Resources | 0 | 100 | |
| Leader Resources | 0 | 100 | |
| Other (Non-Human) Resources | 0 | 100 | |
| Procedures | 0 | <u>100</u> | 100% Total percent agreement for Team Resources |
| Roles and Functions | 0 | 100 | |
| Engagement | 6 | 83.3 | |
| Compensation | 10 | <u>72.2</u> | 85.2% Total percent agreement for Team |
| Identity | | | |
| Envision Goals | 13 | 63.9 | |
| Range of Factors | 15 | 58.3 | |
| Time Horizon | 6 | 83.3 | |
| Manage Uncertainty | 7 | 80.5 | |
| Situation Assessment | 1 | 97.2 | |
| Course of Action | 17 | 52.8 | |
| Expectancies | 7 | <u>80.5</u> | 73.8% Total percent agreement for Team Cognition |
| Monitor and Adjust | 13 | 63.9 | |
| Time Management | 2 | <u>94.4</u> | 79.2% Total percent agreement for Self management |

Table 2

Number of Times Researchers Observed Behavioral Dimension

| | Behavioral Dimension | | | | | | | | | | | | | | | |
|----|----------------------|-----------|------------|----------|----------------|----------|----------|-----------|--------------|-----------|-----------|-----------|------------|----------|----------------|-----------|
| | <u>MR</u> | <u>LR</u> | <u>NHR</u> | <u>P</u> | <u>R&F</u> | <u>E</u> | <u>C</u> | <u>EG</u> | <u>Rof F</u> | <u>TH</u> | <u>MU</u> | <u>SA</u> | <u>CoA</u> | <u>E</u> | <u>M&A</u> | <u>TM</u> |
| R1 | 36 | 36 | 36 | 36 | 36 | 36 | 7 | 1 | 8 | 6 | 10 | 35 | 8 | 10 | 15 | 1 |
| R2 | 36 | 36 | 36 | 36 | 36 | 30 | 17 | 13 | 19 | 8 | 10 | 36 | 25 | 15 | 25 | 1 |

The researchers discussed the reasons for their differences in ratings. They found that one researcher would indicate on the rating sheet that he observed a behavioral dimension if he knew it had been taken into account prior to execution of the task. If the other researcher did not observe the behavioral dimension during task execution then she did not indicate it on the rating form even though she agreed it had been taken into account prior to task execution. An example of this is the behavioral dimension range of factors, representing the cognitive component of the ATDM 2.0 model. Many factors are taken into account prior to an emergency and a plan of action is developed to deal with them.

We were interested in the amount of variability in agreement across the four team components. This comparison was made by averaging the percent agreement between the two observers across all of the dimensions that constitute each team component. These mean percent agreements were 100% for Team Resources, 85.2% for Team Identity, 73.8% for Team Cognition, and 79.2% for Self Management. Clearly, behaviors relevant for Team Resources were relatively easy for the researchers to observe. The cognitive aspects of performance were less obvious.

For each dimension that the researchers rated "observed," they also provided a rating of the team's quality of performance on the dimension. Ratings were provided on a 5-point scale with a scale value of one anchored to "Very Ineffective" and a scale value of five anchored to "Highly Effective." Comparisons of these scores also provide some indication of inter-rater reliability. Because both researchers did not observe all dimensions during each incident, the number of pairs of scores compared are not equal for all behavioral dimensions. Comparisons were made only for those incidents in which both observers rated the dimensions "observed." Two dimensions, Time Management and Envisioning Goals, did not have a sufficient number of pairs of ratings to make these comparisons.

The most interesting finding of this analysis was a severe ceiling effect. There was very little variability in the ratings provided by the two observers. In fact, both observers

considered the teams to be highly effective on every dimension. Table 3 presents the mean and standard deviation of the ratings provided by each observer for each behavioral dimension. All dimensions received mean ratings well above 4.0 with very little variability from either observer. Thus, there was a high degree of reliability among the two observers in rating the effectiveness of team performance. In the next section you will find a similar effect among the BCs mean ratings, but there is a greater standard deviation, indicating more variability in recognizing the quality of performance by people familiar with the domain. This will be explained further in the findings and conclusions section of this paper.

Prior to asking BCs to rate the performance of their teams for the incidents observed by the two researchers, the instrument was revised. Specifically, two behavioral dimensions were removed: Articulating Expectancies and [envisioning] Courses of Action. These behavioral dimensions were addressed by other behavioral dimensions in the cognitive component of ATDM 2.0. Articulating Expectancies is now treated as special cases of either Situation Assessment or Managing Uncertainty, depending on the context. Courses of Action, is now part of Envisioning Goals and Plans. In the firefighting domain, the team takes action directly from the situation assessment as the incident commander watches whether or not the actions are achieving the objectives. With these changes the instrument still addressed the critical dimensions of team decision-making and performance. There was also a secondary benefit of reducing the number of behavioral dimensions: it produced a more compact instrument that was more manageable for the users.

Reliability among researchers and Battalion Chiefs. The data described above answer questions concerning how researchers who are very knowledgeable about the ATDM 2.0 model and not so knowledgeable about the firefighting domain would implement the measurement instrument. However, they do not address questions concerning whether we could hand over the materials to an expert in firefighting and whether these experts would achieve results similar to those produced by the two researchers.

Therefore, we requested that six of the battalion chiefs complete a measurement instrument for selected incidents in which they participated. The criteria for selecting these six BCs were that we observed multiple incidents with each of them and at least one of the incidents was more substantial than a simple respond and recall. All told, we obtained expert ratings for a total of 18 incidents; however, for this portion of the analysis, we did not include the data from two incidents. One incident was not used because researchers did not observe the entire incident. The other was not used because the BC was confused about the rating scales. These data (incidents = 16) were then compared to those produced by the two researchers.

However, the instrument used by BCs differs from the one used by researchers in two ways. The first concerns the removal of two behavioral dimensions from the Cognitive Component of ATDM 2.0 as described previously. The second concerns the categories for indicating whether or not a dimension was present.

Table 3

Mean Ratings of Effectiveness

| researchers <u>Dimension</u> | Observer 1 | | Observer 2 | | Number of incidents <u>observed</u> by both |
|---------------------------------|------------|-----------|------------|-----------|--|
| | <u>X</u> | <u>SD</u> | <u>X</u> | <u>SD</u> | |
| Member Resources | 4.9 | .3 | 4.9 | .3 | 36 |
| Leader Resources | 5.0 | .2 | 4.9 | .3 | 36 |
| Non-human Resources | 4.9 | .6 | 4.9 | .3 | 36 |
| Procedures | 4.9 | .3 | 4.9 | .3 | 36 |
| | | | | | |
| Roles and Functions | 4.8 | .6 | 4.9 | .5 | 36 |
| Engagement | 4.8 | .5 | 4.8 | .6 | 30 |
| Compensation | 4.6 | 1.1 | 4.2 | 1.3 | 7 |
| | | | | | |
| Envision Goals | NA | | NA | | 1 |
| Range of Factors | 5.0 | .0 | 4.8 | .4 | 6 |
| Time Horizon | 4.5 | 1.0 | 4.4 | 1.2 | 4 |
| Manage Uncertainty | 4.8 | .7 | 4.4 | 1.0 | 7 |
| Situation Assessment | 4.9 | .4 | 4.8 | .5 | 35 |
| Course of Action | 5.0 | .0 | 4.8 | .4 | 8 |
| Expectancies | 4.8 | .7 | 4.8 | .7 | 8 |
| | | | | | |
| Monitor and Adjust | 4.7 | .8 | 4.5 | .7 | 13 |
| Time Management | NA | | NA | | 0 |

We asked the BCs to tell us if the dimension was observed during the incident or considered prior to the incident. Our goal was to eliminate the problem identified in the field study where a discrepancy was found between the two researchers concerning when a behavioral dimension was taken into account (before or during task execution). We asked the BCs to indicate whether the dimension was present during task execution, present prior to task execution, or not present at all.

The most effective comparisons to make for these categorizations are those instances where the two researchers agreed; for most dimensions these are fewer than the total number of incidents studied ($N = 16$). That is, the number of incidents used in the agreement formula between researchers and BCs represents the number of incidents where both researchers agreed about the presence of the behavioral dimensions during task execution. For each dimension, Table 4 presents the proportion of incidents in which the BCs agreed with researchers about the presence or absence of a dimension. Note that only one BC was involved in and rated each incident. Therefore, these data compare the ratings of two researchers with one BC for each incident.

Clearly, there is a high level of agreement among the researchers and the Battalion Chiefs for some dimensions, particularly those regarding the four dimensions of Team Resources, and the dimensions Roles and Functions, Engaging, and Situation Assessment. Agreement on two of the dimensions was marginal: Time Horizon (61.5% agreement) and Monitor and Adjust (70% agreement). Agreement on the remaining four dimensions was poor: Compensating (30.8%), Envisioning Goals (0%), Managing Uncertainty (53.8%), and Time Management (60%).

The most reasonable explanation for these disagreements over the presence of Compensating, Envisioning Goals, Managing Uncertainty, and Time Management is that there was not an understanding of the dimensions common to both the researchers and the BCs or that the definitions were applied differently. However, one interesting finding was that of the 37 total disagreements among the BCs and the researchers, the BCs indicated that they observed a dimension when the researchers did not during 29 of the incidents. This finding may indicate that the BCs, experienced in the domain, noticed some cues or behaviors that were not evident to the researchers. Several examples drawn from the incidents indicate where this may have occurred.

Compensation is about anticipating the needs of others and offering assistance, anticipating future events and acting to meet future needs, and taking opportunities to train less-competent members in an attempt to increase their ability to contribute more effectively to the team goal. There are two reasons why researchers did not observe compensation behaviors when BCs did. First, the researchers were not positioned geographically to see the behaviors, and second, the BCs noticed subtle nuances of the situation which the researchers did not have the knowledge to notice.

Table 4

Proportion of Agreement Between Battalion Chiefs and Researchers

| <u>Behavioral Dimension</u> | <u>Number of Cases</u> | <u>% Agreed</u> |
|------------------------------------|------------------------|-----------------|
| <u>Team Resources</u> | | |
| Member Resources | 16 | 100 |
| Leader Resources | 16 | 100 |
| Non-human Resources | 16 | 87.5 |
| Procedures | 16 | 87.5 |
| <u>Team Identity</u> | | |
| Defining Roles and Functions | 16 | 87.5 |
| Engaging | 14 | 92.8 |
| Compensating | 13 | 30.8 |
| <u>Team Cognition</u> | | |
| Envisioning Goals | 9 | 0 |
| Assessing the Situation | 15 | 100 |
| Focusing on Range of Factors | 9 | 66.7 |
| Focusing on Time Horizon | 13 | 61.5 |
| Managing Uncertainty | 13 | 53.8 |
| <u>Team Self-Management</u> | | |
| Monitoring and Adjusting | 10 | 70.0 |
| Time Management | 15 | 60.0 |

When a ladder company put up a 28-foot ladder instead of a 35-foot ladder in a Police Assistance response, this is an example of the team not anticipating the needs of the police. The police, who are not as skilled with climbing ladders as firefighters are, can get onto a roof more easily with a longer ladder. The BC told the ladder company to use the 35-foot ladder instead and explained the need for it. The researchers did not see this interaction between the BC and the ladder company officer. Another incident which was missed by researchers but is clearly a behavior which indicates compensation, is when a BC described to an officer the procedures for handling witnesses to a firebombing.

Firefighters are trained to anticipate future needs and to be flexible in their roles. This flexibility occurs when changes in the situation are communicated, allowing firefighters to move in and out of various positions. In one incident, a rescue team responded to a fully-involved fire in a three-story rowhouse. They immediately began helping the ladder company vent the roof. The BC in command of this fire used this as an example of compensation, but the researchers believed the rescue team was simply doing their assigned role. It is difficult for an outsider to know what is inside or outside of the realm of role responsibility.

Some companies are given the freedom by their BCs to change the typical response pattern depending upon the conditions of the situation. For instance, the first-arriving engine company positions itself at the front of a building and the second-arriving engine takes the back. In one incident, the first-arriving engine passed around the back of a building where the officer noticed a fire that was in risk of spreading. Instead of going to the front of the building, they stopped in the back. In this case, the BC observed the team compensate for what was a restricted SOP for this incident.

The intricacies of a domain will often go unnoticed by an outside observer, leaving them at a disadvantage. Discussions with the BCs reinforced our belief that different instantiations of behaviors will emerge for different domains, illuminating the importance of using SMEs to develop a team performance measurement instrument.

Time management was also observed more times by the BCs than by the researchers. BCs reported the need to manage time if the situation has the potential for worsening and it is necessary to take specific actions to circumvent negative outcomes. Time management occurs as part of the BC's situation assessment and this may be the reason BCs rated its presence more often than the researchers.

BCs observed behaviors representing the behavioral dimension, Envisioning Goals in each of the 16 incidents whereas the researchers observed them in only four. BCs indicated that Envisioning Goals is a team performance dimension that is considered by the team prior to task execution. Many fire departments conduct informal lessons-learned sessions to discuss how they might have fought the fire differently. This gives the team an opportunity to clarify the commander's goal and the actions to reach those goals. In this domain, the companies know their commander's goal before executing the task. Researchers did not observe this dimension during task execution.

The dimension, Envisioning Goals, is a critical team performance process. It can become a problem on the fireground when a BC expects his battalion members to know his intent without communicating it explicitly at any point. This was the situation in one battalion where the BC ordered a company to the roof with the expectation that they would begin ventilation. Instead, the company went to the roof and waited. When the BC noticed that the fire did not do what he expected it to do if the ventilation had occurred, then he radioed the officer on the roof to ask him what was going on. The officer reported that he did not know that the BC wanted him to vent. The BC's intent was for firefighters to vent anytime they are sent to the roof, unless otherwise directed.

Behaviors representing the behavioral dimension Managing Uncertainty were observed more by the BCs than by the researchers. We are aware of three possible explanations for this discrepancy. First, the behaviors listed by the BCs as indicative of this dimension included gathering information and passing it onto the BC who then develops a more accurate and certain picture. This is very similar to the definition of Assessing the Situation. It is possible that researchers did not convey the specific differences between Managing Uncertainty and Assessing the Situation, causing the BCs to use the behavioral dimensions interchangeably. The second reason may be that for situations lasting less than 30 minutes, the act of assessing the situation is strictly the act of reducing and managing uncertainty. In longer incidents or for other domains, the need to manage uncertainty may be greater. And finally, the act of managing uncertain often involves recognizing and dealing with missing or incomplete information, i.e., knowing what you do not know. Since it is often difficult for outside observers to see behaviors that are present, it is not hard to imagine that seeing behaviors that are absent would be even more difficult.

Similar to the researchers, the BCs considered the performance of their teams as very effective. Table 5 presents these data for each of the behavioral dimensions. Again there was a ceiling effect; the lowest mean rating of effectiveness was 4.3 on a 5-point scale. However, there was more variability in the BCs ratings.

We designed two questionnaires to address issues concerning useability and acceptability. The first questionnaire addressed the issues about whether or not this instrument directed the BCs attention to critical team performance processes and if it helped the BC establish training recommendations.

We were interested in the BCs subjective rating of overall team performance for each of the 18 incidents. (Note: The data from the two incidents not used in the previous analysis was considered appropriate to use here). We used a 5-point rating scale, with a scale value of one anchored to ineffective and a scale value of five anchored to highly effective. BCs used a rating of highly effective for 12 of the teams. Of the six teams that received a lower rating, three received a rating of 4, and three received a rating of 3. Two points can be made from these data. Teams whose performance was rated highly effective exhibited more behaviors indicative of the ATDM 2.0 dimensions than teams whose performance was rated less than highly effective. In most cases, if the team's overall performance was rated highly effective their performance on the behavioral dimensions was also rated highly effective.

Table 5

Mean Effectiveness Ratings Provided by Battalion Chiefs

| <u>Behavioral Dimension</u> | <u>Mean</u> | <u>S.D.</u> | <u>N</u> |
|------------------------------|-------------|-------------|----------|
| Member Resources | 4.7 | .9 | 12 |
| Leader Resources | 4.7 | .5 | 12 |
| Non-Human Resources | 4.3 | 1.2 | 10 |
| Procedures | 5.0 | 0 | 10 |
| | | | |
| Defining Roles and Functions | 4.8 | .4 | 10 |
| Engaging | 4.8 | .6 | 10 |
| Compensating | 4.5 | .8 | 12 |
| | | | |
| Envisioning Goals | 4.8 | .6 | 12 |
| Focusing on Range of Factors | 4.6 | .9 | 9 |
| Focusing on Time Horizon | 5.0 | 0 | 5 |
| Managing Uncertainty | 4.5 | .8 | 10 |
| Assessing the Situation | 4.7 | .6 | 12 |
| | | | |
| Monitoring and Adjusting | 4.4 | 1.0 | 9 |
| Time Management | 5.0 | 0 | 6 |

Our next area of interest concerns whether the instrument directs the BCs' attention to areas of performance where intervention is most needed. To answer this we asked BCs to list the team processes they would like to see improved for each incident. We also asked them to recommend an intervention for the team operating during each incident. For six incidents where the BCs rated the teams overall performance less than highly effective, processes and interventions were identified for five of them. For the other 12 incidents where the teams were rated highly effective on their overall performance, only two processes were identified as deficient. Interventions to improve the teams' performance were identified for only three of these 12 incidents. For instance, one firefighter from an engine company was detailed to a ladder company. The BC noted that he did not perform well as ladder

personnel, that he broke out too many windows. Two recommendations were made by the BC. One was to provide this firefighter specific ladder training and the other was for the BC to be more specific with his instruction in these kinds of situations. To summarize, the instrument focused the BCs attention on the team performance processes that are in need of improvement and directed the BCs to identify interventions for improving these processes. Whether or not the interventions identified by the BCs would improve the team's performance was not examined in this study.

Finally, we asked the BCs to rate the usefulness of the instructional package. All six of the BCs reported that the package helped them to understand team performance. Five of the six reported that the package helped them to improve team performance on line. The one BC who disagreed with this statement reported that the booklet will not help team performance on the fireground because team performance is taught to firefighters from the first day on the job and every day there after.

Six of the BCs reported that the instrument would help them conduct After Action Reviews by helping them to identify and reinforce what went well and what did not. One BC reported the criticality of analyzing team performance to improve the effectiveness of post-incident analysis. Six of the six reported the instrument's usefulness for helping them to convey team performance concepts to firefighters. One BC reported how helping the firefighters understand team performance concepts will help the incident commander organize, manage, and coordinate fireground operations.

Finally, only three of the BCs thought the package contained appropriate language for firefighters. Some suggestions include wording everything in fire-fighting language, simplifying terms like "Time Horizon" to "time to accomplish task," and reducing the length of the instructions. One positive part of the instrument concerns the listing of behaviors to help the user understand the meaning of the behavioral dimensions. One BC commented positively about how the examples of behaviors under each behavioral dimension helped him to understand its meaning.

Findings and Conclusions

The measurement instrument based on the ATDM 2.0 model is currently a draft version. It is not fully ready for use in field settings. However, the field study reported here produced several interesting findings that indicate the instrument has considerable promise for assessing and diagnosing the dynamic processes of team performance in operational environments. The following paragraphs describe several of these findings.

The first concerns the utility of the ATDM 2.0 model for describing team performance on the urban fireground. Because the origins of the model were in military command and control, we had concerns that portions of the model would not be appropriate for firefighting teams or that elements key for describing firefighting teams would have been omitted. We found that this was not the case. The observers and domain SMEs noted

examples of each of the behavioral dimensions as they evaluated the various teams, and each of these dimensions had some critical value during at least one of the incidents observed. The model accurately captured the team processes required for successful performance on the urban fireground.

In building the ATDM 2.0 model, our intent was to describe critical team processes at a general level. That is, the model was to be a model of team processes that generalized across a large array of team domains. The levels of team components and behavioral dimensions allowed this generality. Specificity for a particular domain was to be achieved at the lowest level of the model, the behavioral markers. The markers are observable behaviors, specific to the domain, that indicate the quality of performance on a certain behavioral dimension.

Our concern was that identifying these markers would be prohibitively difficult, thus limiting our ability to modify the measurement instrument from one domain to another. In fact, adapting the draft instrument from the original domain (battle staff) to urban firefighting teams proved relatively simple. Many of the markers obtained through interviews with Army commanders proved useful for firefighting. There is a considerable overlap in the two domains, particularly regarding the command structure. Furthermore, eliciting markers from the Army commanders provided us a template and prepared us to do the same with Battalion Chiefs (BCs). With relatively few interviews ($n=9$), we were able to build a comprehensive list of behaviors that represented performance on each of the dimensions for the firefighting teams. These markers were then converted to "indicators of effective performance" for the measurement instrument.

A second set of findings involve the effectiveness of the instrument itself. We found that researchers could apply the measurement with a high degree of reliability when assessing the performance of the firefighting team, both in terms of identifying the relevant dimensions and rating the quality of team performance. Observers who were extremely familiar with the ATDM 2.0 model and with team performance in other domains, could readily recognize and identify key behaviors in this domain. Interestingly, the domain SMEs also showed a high degree of reliability with the ratings provided by the researchers. Thus, the researchers could communicate the underlying tenets of ATDM 2.0 and the BCs could recognize critical behaviors on the basis of this model. The data presented here did identify some areas of weakness (e.g., envisioning goals and time management). Prior to fielding the measurement instrument, communication and understanding of these areas will need to be strengthened.

The firefighting teams investigated in the field study were all proficient, high performance teams. Each of the BCs was extremely experienced and proficient at his job. Similarly, the team members were experienced and well trained. Most of the teams had worked together for years. This produced a ceiling effect for the ratings of the quality of team performance. Therefore, we now know how the measurement instrument will work for highly proficient teams, but not for less proficient teams. Whether the measurement instrument is sensitive to changes in team performance remains an unanswered question.

A final set of issues concerns the BCs' acceptance of ATDM 2.0 and the measurement instrument. We found this acceptance to be high. In many cases, the BCs found the concepts in ATDM 2.0 and the measurement instrument to reflect their own thinking about team performance in this domain. They were able to put these concepts into the language of the firefighter. Interviews revealed that many of the BCs believed they had a need to improve their team training, and that the model and measurement instrument provided them the tools to focus this training on critical team processes. However, the usability of the instrument can be improved. It's current form is too long and bulky. BCs would experience difficulty completing the instrument during the course of an incident. It needs to be abbreviated and constructed in a way to make it conducive for use and reference in the field.

References

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Appendix A

Battle Staff Team Performance Assessment Tool (TPAT)

TEAM CHARACTERISTICS. This component refers to the formation or foundation of a team. The characteristics may represent the individuals on the team (e.g., competency on individual skills) or the team itself (e.g., the degree to which the team employs shared practices). Each dimension included under this component of team performance has a direct impact on the team's capability for achieving a goal. There are three dimensions of this component. Each is defined in the following section and accompanied by the behaviors that represent high and low performance on each dimension.

1. **Member/Leadership Competence**. This dimension refers to the ability of the individual team members to perform their specific tasks. This includes the leader's ability to perform leadership tasks. The team cannot function unless its individuals have a certain basic level of competence. If the general ability level is low, then the team will not be capable of developing sophisticated plans.

HIGH Staff members are not vague; they use specific language when talking about their areas of specialty.

Staff members discuss the behaviors they expect the enemy to display.

Staff briefings reflect the integration of essential/relevant staff areas.

Staff briefings reflect doctrinal practices.

Staff briefings reflect knowledge of tactical techniques and procedures.

Staff briefings reflect knowledge of terms.

Staff briefings reflect knowledge of graphics.

Staff members incorporate Decision Support Template, Synchronization, and Execution matrices into the operations order.

The DST, Synchronization, and Execution matrices are formatted correctly.

The DST, Synchronization, and Execution matrices match the mission and the conditions of the battlefield.

Overlays reflect accurate information.

All products have been cross-checked with the overlay.

The S2, S3, and other appropriate command and control maps are updated as often as is necessary to keep the staff informed of the battlefield situation.

The appropriate C2 maps reflect common information.

The XO calls staff to huddle around the common map.

Staff members have tactical knowledge about principals of defense.

LOW Staff members, more often than not, do not provide the commander informed input for decision making.

Staff members are working in their own staff areas when they should be coordinating tasks.

Commanding Officer is forced to request information about the battlefield because the staff members who are receiving the information do not pass it on.

When information from higher headquarters is received by the staff, it is not being passed to the CO when it can be.

2. **Shared practices.** This dimension refers to the degree to which the team effectively implements procedures. The skill with which these procedures are implemented evolves out of the experience of operating together. This dimension refers to the relevance, quantity, and quality of practice a team employs to become proficient with both standard operating procedures and non-routine tasks. One indication of weakness in this area is that members are unable to handle routine tasks that should be performed as if they were second nature. An indication of strength in this area is that the team not only handles routine tasks effectively, but also deals effectively with non-routine tasks.

HIGH When an order is given that requires the activation of a standard operating procedures (SOP) like Warning Orders, wargaming, etc. the staff responds rapidly and automatically.

Updated charts (combat power, timeline, etc.) are present and accessible.

Each staff area maintains its status in terms of resources, location of resources, and what they are doing.

The SOPs match the desired task.

Established TOC SOP checklists are visible in the TOC.

When the staff receives an infrequently occurring requirement, the right people are notified and come together in a coordinated fashion.

LOW Staff is not engaging in standard operating or other common procedures.

Staff members are working in their own areas with little interaction with other staff areas.

Staff officers question the accuracy of charts.

The XO or the S3 is telling the staff sections what to do more than 50% of the time.

The XO or S3 is continually reminding the staff to perform various tasks that should be guided by SOP.

Response to non-routine staff procedures is poor.

3. Command climate. This dimension refers to the entire team's attitude toward accomplishing its mission as well as the command's guiding policies and procedures. The command climate is created and cultivated initially by the commander, but is influenced by the different personalities of the team. Command climate is reflected in how the team approaches its mission on a daily basis. A positive command climate is one in which the team members maintain healthy discipline toward the task, are assertive in fulfilling their duties and the team's goal, and respect each other. The opposite of this represents a negative command climate.

HIGH Staff members persist in following procedures (checklists, manuals) even though they are tired and are under a high degree of stress.

When staff members are tired and under a high degree of stress, radio transmissions are crisp and clear.

Individuals are not complaining about how tired and overworked they are.

In the interest of carrying out the intent of the CO, staff members are persistent in making their needs known to higher headquarters and other organizations.

Individuals voice divergent views.

Although there are divergent views, all staff members agree to work on the decided courses of action even if they oppose the chosen course.

Staff members are doing their assigned tasks without being told and are keeping the CO/XO and other staff members informed.

At some point in the play, the commander talks to subordinates either as a group or individually about how something could have been done better.

LOW There is friction between staff members.

Staff members do not take initiative.

Little information is being passed between staff areas.

Initiative is quashed by the XO.

There is very little bantering between staff members. Instead, they appear guarded and suspicious.

During staff huddles, only the XO talks.

When a staff member offers a differing view, the XO puts the person down.

The staff appears divided into cliques.

Subjective measurements of command climate:

HIGH Staff members are disciplined

Staff members are respectful

Staff members defend perspectives in a respectful and disciplined manner.

LOW Staff members appear afraid to make a mistake

TEAM IDENTITY. This component concerns the extent to which team members conceive of the team as an interdependent unit, and operate from that perspective while engaged in the task. Decentering, from a team perspective, is the process through which people think of themselves more as members of a team and less as individuals performing jobs. There are three dimensions of this component. Each is defined in the following section and accompanied by the behaviors that represent high and low performance on each dimension.

1. Defining Roles and Resources. This dimension refers to the extent to which team members understand the task responsibilities, expertise, and roles of every other member. In addition, this refers to the extent to which team members understand the resources required by the team for performing its functions (radio, CP environment, information sources).

HIGH Staff members use SOP and checklists to complete performance tasks.

Staff members refer to and use the Table of Operations and Equipment (TO&E) and other manuals relating to resource allocation.

When a specific event occurs, or when specific information is received, the interactions between members look automatic as they coordinate the tasks that were pre-assigned to them.

When a non-routine event occurs, the XO directs the activity.

Staff is drilled to make sure they have experience.

Workload is shared by all members of a staff section.

LOW A particular task was not completed because some staff member/s dropped the ball during a staff activity.

Some staff members do not perform their tasks until they are told to do so.

Staff members are not responding to orders and events.

Only one person is completing the tasks while others are sitting around.

2. Engaging all members. This dimension refers to the extent to which the team members participate in the team's work and take responsibility for reaching the team goals. This dimension includes behaviors that signify self involvement as well as the encouragement of other members to get involved.

HIGH Chief of staff actively encourages involvement.

Staff members keep the CO informed of the status of the battlefield.

Staff members keep staff leaders informed of the status of the battlefield.

Staff members keep other staff members informed of the status of the battlefield.

Individuals articulate their own individual experiences with particular types of operations.

Both competent and less-experienced staff members are fully engaged during activities that require interaction.

LOW The leader asks staff members for information about status and progress.

People are sitting around doing nothing.

A majority of the staff is sitting in their own areas, and don't come out except when called.

All activity is closely directed by staff leaders and/or the XO.

The S2 and the S3 don't have the same thing on their maps.

3. Compensating and coaching. This dimension refers to the extent to which team resources are shifted to cover areas where the team cannot satisfy its roles, functions, and responsibilities. Compensating is evidenced when team members step appropriately outside of their assigned team roles or functions or add to their assigned functions in order to help the team reach its goals. Coaching occurs when more experienced members offer direction to less-experienced members for the purpose of bringing individual team members to a greater level of individual proficiency, thus bringing the entire team to a more advanced level of performance.

HIGH Senior staff are working with junior staff in an attempt to cross train them.

Leaders are coaching subordinates to use Manuals and templates in order to understand their roles and the battlefield situation.

TOC shifts are balanced in terms of equal capabilities among staff members.

More-experienced staff members ask questions of less-experienced staff members in a way that stimulates the less-experienced member to think about what they are doing and to get them to consider things that they wouldn't have considered before. Members who have experience with specific operations are called to perform a role outside of their normal position.

During breaks you will see people rehashing what they have just finished and

hammering out ways it could have been done better. In a high-performing team the squad leader may or may not initiate this discussion.

LOW Ill-trained staff members are compensated for in the short term, but are not coached or trained in that task.

Leaders give staff members the answers instead of referring them to the doctrinal manuals, 101-5 and 71-2.

Staff members are not referring to doctrinal and other manuals that will allow them to become more experienced and knowledgeable about their job.

There appears to be friction among team members.

TEAM PLANNING AND DECISION MAKING. This component concerns the team's ability to operate as an intelligent entity that thinks, solves problems, makes decisions, and takes actions collectively so that task demands are met. There are five dimensions of this component. Each is defined in the following section and accompanied by the behaviors that represent high and low performance.

1. Envisioning goals. This dimension refers to the extent to which the goals of the team are understood and used to direct the team's behavior toward those goals. There are three essential aspects to envisioning goals: the team's ability to identify its goals, the team's ability to ensure that all members of the team share a common definition of the goals, and the degree to which this shared understanding contains a workable temporal element. In advanced teams, the understanding occurs early and continues throughout the exercise.

The most critical aspect for achieving a common focus is for the team to know what the CO has in his mind.

HIGH CO uses standard terms and graphics contained in the military manuals.

When a commander uses terminology which is unique to the unit, he describes exactly what is meant.

When conveying intent, along with conveying what he wants to happen, the CO also refers specifically to what he doesn't want to happen.

Available resources are addressed and considered when determining goals and intent.

Real-world constraints and limitations are considered when determining Commanders Intent and goals.

Briefbacks are employed.

CI is repeated in multiple documents, briefings, etc.

2. Maintaining dynamic focus: This dimension refers to the team's ability to focus its planning and decision making within an appropriate span of time (time horizon) and on a relevant breadth of concepts and information (range of factors). It concerns the team's ability to focus its attentional capacity on the most relevant cues. The two indicators for adequate focus are:

Time horizon. There are three aspects of time horizon.

(1) Awareness of the time it takes for an action to be accomplished given the constraints of the environment.

- (2) Awareness of multiple time horizons during planning and execution.
- (3) The team's ability to focus ahead to anticipate and act on upcoming events.

HIGH Timelines are developed that include times from mission receipt to mission conclusion.

Timelines include the involvement of successive echelons.

Subordinate elements of the force develop timelines.

It is clear which military functions are and are not included in the timelines.

The timeline produced by the XO matches the staff's timeline.

Staff uses a planning factors workbook which contains realistic times for battlefield occurrences.

Lower echelons receive orders in enough time to implement them.

The timeline was realistic.

Products such as situation template for portrayal of enemy in the planning phase, synchronization matrices, and operation overlays are finalized and distributed in enough time to be used as input to another product.

Staff areas proactively seek information which will assist future planning and activities.

Staff areas think through battle activities and develop contingency plans.

LOW Future events are anticipated, but no action is taken to set up a response to the event.

3. Range of factors. This indicator concerns the team's awareness of the many factors that are considered for planning and decision making. The concept of range of factors refers to the team's ability to consider an appropriate number of factors; not so many that it becomes paralyzed, and not so few that the solution results in error.

HIGH Relevant range of factors is identified during planning.

Relevant range of factors is considered during situation assessment.

Relevant range of factors is identified during decision making.

Staff assesses the mission.

Staff areas gather information and facts relevant to their specific areas and relevant to specific staff huddles.

Critical factors are identified and prioritized through developing the Commander's Critical Information Requirements (CCIR), Priority Intelligence Requirements (PIR), and Intelligence Requirements (IR).

All logs are updated.

Adjacent units are on maps and overlays, and staff are looking at the broad context of operations, that is, beyond the confines of the boundary lines of other units.

Information is exchanged with adjacent units, maps are updated, and information is disseminated as a result of this exchange.

The context of the battle is discussed during shift changes.

When a METT-T change occurs, the context of the battle is addressed.

Complete range of issues are identified and articulated to the CO and the XO during briefings and staff huddles, exchanged between relevant staff members, and logged and posted.

Critical issues (as opposed to factors) are identified and prioritized.

Staff is coordinating and interacting with higher headquarters.

LOW The operational issues that must be addressed by the CO/Staff are not identified.

All potential combat power is not considered.

Staff operational charts and reference materials are not used.

Records of what has and has not been done are not kept.

Activities outside the immediate sector or area of responsibility are not considered.

During shift changes and changes in METT-T, the CO and staff lose their focus.

The CO and staff do not focus the BDE/TF on the scope of operations throughout plan, preparation, and execution.

4. Situation assessment. This dimension concerns the team's ability to form and maintain a shared understanding of the situation with which it is operating. Arriving at a

shared understanding of a situation involves forming plausible scenarios about what is happening and holding onto alternative hypotheses until ambiguity is resolved. In a team setting where more than one assessment of the same situation may be made, the processes of diverging and converging are critical for bringing the team to a common and rich understanding. In dynamic environments where information coming into the team can change the team's assessment of the situation, maintaining a common understanding is critical.

Divergence. This process concerns the team's ability to seek views about the situation from a variety of team members and to hold on to ambiguous information until it can be resolved.

HIGH Staff members are attentive and interactive (engaged) during issuance of CO's planning guidance.

Staff members from a specific area of expertise comment and provide input to their own critical mission analysis and contribute to the development of analyses conducted by other staff areas.

Staff members use sound logic when arguing their positions.

Staff members listen and interact while others state their ideas/positions.

Staff members seek all pertinent factors that impact their viewpoints or others' viewpoints.

During wargaming, staff members articulate various options about "how to fight."

Staff members understand when divergence is needed and positive.

The devil's advocacy role is played.

Different interpretations of data are elicited.

LOW Staff members never express strong positions.

Staff members accept the "group" view without question.

5. Convergence. This process concerns the team's ability to harness various views to form a situation assessment that is as close as possible to ground truth. The methods used to harness the many and varied views include the use of maps, diagrams, messages, and

meetings to ensure that relevant team members are viewing the situation similarly and are working from a similar perspective.

HIGH The ideas or concepts embodied in the operations plan are documented and someone on the staff team announces that the document represents what was agreed upon.

Convergence occurred on time.

Once a decision is made, the entire staff goes with it.

The total task force situation is discussed during staff huddle.

Information about the decision is shared among staff sections.

The command net is set up with all necessary function "leaders" on it.

Maps, overlays, charts, staff huddles, and briefings are used to convey battlefield context, display and verify the decision made.

When the announcement is made that the documentation reflects everyone's understanding of the situation, backbriefs are employed to ensure common understanding.

LOW Staff members do not attempt to resolve ambiguous information.

Only one individual is permitted to express opinions.

Staff is tracking battle preparation and battle execution, but is not anticipating required involvement nor coordinating information with the rest of staff.

6. Maintaining. A situation assessment is initially developed, but as the battle staff take various actions, more information about the situation is gained, thus changing the assessment. Awareness of the situation must be maintained throughout each stage of the battle. This involves not only refining the situation, but also ensuring that all staff members have a common understanding of the refined assessment.

HIGH Maps, overlays, charts, staff huddles, and briefings are used to convey battlefield context, display and verify the decision made as more information comes in.

Staff analyzes new input to determine impact on current situation assessment and takes action to coordinate with others.

Staff huddles are called to summarize perceived ground truth.

The situation is reflected in the Ops map.

The situation is reflected in the Intel map.

Recent, current, and projected activities of the friendly and enemy forces are discussed in the staff huddles.

During the staff huddles, there is not a lot of disagreement about the SA.

When information comes in that causes reassessment of the situation, the staff goes through the cycle of diverging and converging.

Staff members are updating information through each phase of the battle.

Clear logs are kept and posted.

LOW Staff is not cognizant of progress of preparation in their area of responsibility.

7. Envisioning and evaluating courses of action. This dimension concerns the team's ability to use its collective experience to visualize how a plan will be coordinated and conducted, and to visualize where it will run into trouble.

HIGH Enemy situation templates are adapted to reflect ground truth.

Discussion among members indicates they have visualized the map terrain as 3D, with trees, hills, etc.

Discussion among members indicates they understand the language and terminology of the graphics.

Staff is disciplined, yet flexible (creative, innovative, imaginative) while wargaming the COA.

During situation assessment, staff members think through alternative courses of action.

All available friendly and enemy combat power is evaluated during wargaming and each staff officer provides his vision of the impact of their area of responsibility on the operation.

Places where timing might be tricky or difficult are identified and articulated to the staff, the CO, and the XO in the context of the wargaming process.

Staff members do not consider the effect of alternative COAs.

Staff members do not participate in "mentally" fighting the battle.

Staff members do not consider tactical imperatives.

Staff members take a cookie cutter approach to visualizing how a plan might develop.

Staff members are taking a rote approach to applying procedures.

Staff members do not take into account how long it takes for certain units to move x distance.

Staff meetings have no agenda; people are bringing up subjects that are not relevant.

Staff members do not conduct evaluation of COA.

8. Articulating expectations. This dimension refers to the extent to which the team articulates its expectations about the progress of a course of action to relevant team members. Formalizing the process of making expectations explicit helps the team attend to relevant information and serves as an alerting function, thus increasing the team's ability to grasp the significance of a message and react quickly.

HIGH Expectations are based on where the enemy is and where it is not.

S2 takes the Intelligence Planning of the Battlefield, the Situation Template, the terrain and weather analysis, and joins with the rest of the staff to generate the Decision Support Template (DST).

As staff members analyze their expectancies, there will be divergent views.

Information about expectancies is given to the staff who are developing the DST.

Executive Officer/Chief of Staff conducts necessary staff "huddles" to bring all staff members up to date on concept development and situation assessment.

LOW Contingency options are not identified.

Staff is not tracking battle progress.

CDR/staff does not articulate his expectations relative to tactical commitments or employments.

TEAM SELF MANAGEMENT. This component refers to the team's ability to observe its team performance processes, recognize its level on the team characteristics, and make adjustments to reach a higher level of performance. There are four dimensions of team self management. Each is defined in the following section and is accompanied by the behaviors that represent high and low performance.

1. **Monitoring.** This dimension refers to the team's ability to examine itself for signs of both effective and ineffective teamwork behaviors. The purpose of monitoring is for the team to recognize how it's operating as a team and make adjustments for meeting the team task. Recognizing effective behaviors increases the team's ability to use them in the future. In addition to monitoring in the present, the team can look into the future to anticipate events that will require specific team performance strategies.

HIGH Friction between staff members is addressed.

When staff members recognize that they are falling behind the timeline, they become more focused to meet the outcome on time.

Someone on the staff is asking staff members to get involved in the task.

If staff officers are not bringing their area of expertise into the wargaming session, someone is making sure they are.

When staff members are not functioning normally (because of being ill or fatigued) someone is asking about their welfare.

Subordinate staff leaders monitor their staff sections for individual performance, welfare, and attitudes.

The team is monitoring all dimensions under all components of this team performance model.

The CO stated the importance of team performance.

During AAR, team performance is addressed.

Members of staff "police" their section for people who have disengaged.

Staff shifts are monitored to remain balanced and able to perform necessary tasks.

LOW Friction among team members is outward and obvious, with some members angry with one another and unable to work together.

The team tasks are not completed on time.

During AAR, only what the team did wrong is addressed.

2. **Adjusting.** This dimension refers to the team's ability to change team performance, or make proper adjustments to the current strategy when it becomes less effective, or isn't working. It also refers to the team's ability to anticipate changes that may require different strategies for meeting the demands of a future task or situation.

HIGH Appropriate changes are made to the concept of operations when something is not going as expected or planned.

Members are encouraged to use initiative when operational changes are required.

When necessary, the CO modifies existing roles and functions through clear, crisp direction.

If members step out of doctrinal roles and functions, they do so according to established procedure.

Staff members are making appropriate decisions at their level of authority to adjust previously agreed upon plans.

Adjustments are made in a timely manner.

Staff members are actively recommending changes to OPORDER when necessary.

Staff members change SOPs when the previous ones fail to meet the goals of the task.

LOW Staff continues to support initial plan even though battlefield situation has changed.

Staff members don't take action on reports that indicate action is needed.

3. **Detecting gaps and inconsistencies.** This dimension refers to the extent to which the team actively attempts to discover and fill gaps in the team's information base and assumptions; to recognize and handle inconsistencies or contradictions that might be present either through eliminating the inconsistencies or noting them until they can be resolved.

HIGH The CO steps away from the activity of the battle staff and takes time to reflect about the bigger picture.

Staff members ask, "What haven't we considered?"

Staff members ask, "What are we missing?"

Staff members ask, "What don't we know?"

The staff is using briefbacks, rehearsals, and staff "huddles" to identify inconsistencies and gaps.

When gaps are detected, corrective actions are recommended.

Gaps and inconsistencies are brought to the attention of appropriate members or the COS.

The CO identifies gaps and inconsistencies at the level of his intent statement.

Staff is maintaining situation awareness.

The staff is assessing the impact of gaps on the overall plan and corrective actions are recommended.

LOW The whole team is focused on one COA and doesn't consider contingency requirements.

Details are missed or not discovered until the OPORDER is ready.

Staff does not properly track battle preparation and does not assess shortfalls in their area of responsibility.

4. Time management. This dimension refers to the team's ability to meet goals before deadlines overtake them. Managing time includes sequencing sub-tasks so that output from one task connects where and when it should as input to the next task.

HIGH Staff sets up timelines, with beginning and end times, that trigger staff actions.

Staff sets up timeline which includes all necessary process steps.

The staff engages in a technique called "backward planning."

Staff members extract LD times, back up 2/3, and designate the time that the order needs to be completed.

Staff members recognize and articulate time constraints that dictate when they have to "move on."

Time Management charts are completed and displayed for all team members.

Time Management charts contain procedures and unit operational events for all aspects of the mission.

Time Management charts contain timing for critical and complex sub-missions.

CO monitors the master time management chart.

CO and staff team are addressing future operations appropriately.

Appendix B

Definitions and Descriptions of Behavioral Dimensions for Fireground Battalion Chiefs

CATEGORY: TEAM RESOURCES

Dimension: Member resources

This dimension refers to the team's understanding of its members' capabilities. Capabilities include the skills, knowledge, mental and physical abilities, experiences, and personalities. What is critical to team performance is not so much knowing how "good" the individuals are, but knowing what resources the team has to work with. By having a good understanding of the member resources, the team will be better able to match these resources to the demands of the task.

Planning. When planning who will do a particular task, the team should assess members' strengths and weaknesses and make sure all members understand what is available. All members should know who brings what strengths.

Execution. Before executing a task, the team should try to gain an understanding of its member resources. You'll see this dimension during task execution if members are monitoring the on-going status of team members and making appropriate adjustments in the event of fatigue, injuries, or inability to do the job.

Indicators of effective performance in the firefighting domain

- BC ascertains who is in each company during a given shift prior to an incident.
- BC ascertains the competence level of individuals in the battalion.
- BC listens to the radio and knows which companies are responding to the incident.
- BC ascertains who can and who cannot handle an incident. This includes the ladder and engine companies, the medics, and the officers.

The value of this dimension to team performance. One Battalion Chief was called to a fire across town. On his way there, the engine company officer placed it under control. The Battalion Chief believed the officer put it under control because he knew it was a long way for the Battalion Chief to go; he was not yet completely confident in this officer's skills. The Battalion Chief ended up going anyway and spent an hour on the fireground. The Battalion Chief's knowledge of the way this officer worked increased the operating efficiency of the team.

Methods for learning about team members. The capabilities of members can be assessed through observations, informal discussions, interviews, education records, and resumes. You may also employ more formal assessment methods such as psychometric, intelligence, or skills tests.

CATEGORY: TEAM RESOURCES

Dimension: Leadership resources

This dimension is about team members' knowledge of their leaders' capabilities and preferences.

Planning. The team should discuss the strengths and limitations in its leadership resources and be clear about its leadership needs.

Execution. Before executing a task the team should have knowledge of who the leaders are and an understanding of how they will operate. If modifications to leadership are made during execution, the changes need to be communicated to the whole team.

Indicators of effective performance

- BC understands what the officers in each company can and cannot handle.
- BC determines who is in each company during a given shift.
- If the officer of the ladder or engine company arrives on the scene before the BC, all are clear about who has leadership responsibility until the BC arrives.
- When the BC arrives, he receives viable information and then takes command.
- When the Deputy Chief arrives, he slowly eases himself into the command position. Taking over immediately may disrupt execution of the firefight.

The value of this dimension to team performance. This dimension is not about the strength or the style of the leader. Instead, it is about the team's knowledge of the leader's strength and style. Knowing this allows the team to work within a particular style. Leadership functions must be performed. If one leader is incapable, unwilling, or too busy to fulfill the functions, then these functions must be distributed.

Methods for learning about leadership. Leadership resources can be assessed through observation and discussion, or through formal methods such as leadership profiles and interviews. Firefighters should be encouraged to get to know their leaders.

CATEGORY: TEAM RESOURCES

Dimension: Non-human resources

This dimension refers to the equipment, apparatus, tools, supplies, vehicles, and computers/software that are available to the team to get the job done. The key to this dimension is the knowledge members have about what's available, its capabilities, and how it operates.

Planning. When making plans to execute a task, the team should verify what resources are available to them, and identify weaknesses and strengths. This information is communicated to the whole team. If resources are added, then the team needs to know about them.

Execution. The team's understanding of the resources available to them should be ascertained prior to task execution. You will see this dimension when changes to resources occur during execution. These changes need to be communicated to the whole team.

Indicators of effective performance

- BC checks the dispatch notification sheet to find out what equipment he will have available to work with on the scene. This is referred to as the company rundown.
- Each team member knows what equipment will be arriving at a given incident.
- Each team member knows which resources are carried in the various vehicles.

The value of this dimension to team performance. Knowing the resources that are available to the team allows members to take steps to maximize their use. Conversely, knowing what it doesn't have to work with allows the team to work around the absence. For example, if Rescue One is not available to respond to a job, then the plan of action must include resources to cover the work usually performed by Rescue One.

CATEGORY: TEAM RESOURCES

Dimension: Basic Procedures

This dimension refers to the standard procedures that are in place to provide basic direction and processes for the team members. Procedures are developed to guide the team to more efficient and effective operation. Procedures are enacted by team members through a series of coordinated activities. Team members must be aware of these procedures and how they are implemented. The smoothness with which procedures are implemented indicates the team's familiarity with its basic procedures. Familiarity is gained through both study and practice.

Planning. The team may rely on procedures during planning sessions to direct their activities. Developing procedures that will be used during task execution is different from implementing the procedures. Basic procedures should be established in advance of task execution and task execution will uncover needed changes or additions to standard procedures. During the planning stage we should see the team verify these procedures, communicate them to the team members, and incorporate procedures into the planning process.

Execution. Characteristics of the situation will inform the team about which procedure should be implemented. The characteristics and the subsequent procedure are established prior to task execution. During task execution a well-informed observer can watch to see if team members are implementing procedures appropriately. If a procedure is no longer appropriate for the characteristics of the task and it is altered or discarded, then these changes must be communicated to the whole team.

Indicators of effective performance

- When the team responded to an Assist Police call, all sirens were cut four blocks away from the scene.
- When a Tactical Box call went out, two engines, two ladders, and one BC responded.
- When a Full Box alarm went out, four engines, two ladders, and two BCs responded.
- The first arriving engine took the front, the second engine took the rear, the third engine took the front, and the fourth engine took the rear. The first arriving ladder took the front, the second ladder took the rear. The first arriving BC took the front, the second arriving BC took the rear.
- When nothing was showing, the first arriving BC called for reduced speed of incoming engines.
- The first arriving officer assumed leadership responsibility until a higher ranking officer arrived.

CATEGORY: TEAM IDENTITY

Dimension: Defining roles and functions

This behavioral dimension refers to the articulation and understanding of the task responsibilities, functions, and roles of every other member. Once roles and functions are understood, the team can take advantage of the individual power available to it. Use of this behavioral dimension will facilitate coordination efforts.

Planning. You can observe this dimension during planning tasks by watching to see if team members are clarifying their roles and functions and making sure that everyone understands them. Roles and functions are made explicit.

Execution. Much of the team's understanding of their roles and functions should be achieved prior to task execution. If the team is required to make changes in roles and functions on line, then these changes must be communicated to the whole team.

Indicators of effective performance

- When alarms greater than a tactical box are called, the BCs discuss the roles they will take.
- BCs reminded firefighters about their role in an assist police call. That is, firefighters provide the means for the police to do their job and do not get involved in the incident. This prevents firefighters from getting near evidence and from getting into situations they are not qualified to handle.
- Medics let firefighters know what functions they can serve in a car accident situation.
- It is well known that the BC Aide will serve as a time keeper to keep track of how long people have been inside a structure.

CATEGORY: TEAM IDENTITY

Dimension: Engaging

This behavioral dimension represents the extent to which the team members **participate and encourage others to participate** in the team's work and take responsibility for reaching the team goals.

Planning and Execution behaviors look similar.

Indicators of effective performance

- When an officer is handling a situation, the BC does not take over the situation unless it is necessary. If he does take over, it may discourage the officer from taking responsibility.

CATEGORY: TEAM IDENTITY

Dimension: Compensating

This dimension refers to the movement of team resources to cover areas where the team cannot satisfy its roles, functions, and responsibilities. Compensation involves three team actions: covering for others, coaching, and anticipation.

Covering for others involves team members stepping appropriately outside of, or adding to, their assigned team roles or functions in order to help the team reach its goals.

Coaching occurs when a team member helps another team member achieve a greater level of individual proficiency. The entire team benefits from coaching because the team moves up to a more advanced level of performance by improving the capabilities of its members.

Anticipation involves anticipating the information needs of members who have become overloaded by uncertain conditions and time constraints. It also involves members offering information and help to reduce the burden of overloaded members.

Planning. Compensating is evident in two ways during planning. First, to develop a plan, members of the team carry out specific roles and functions. During planning tasks you can watch members cover for others, coach others, and anticipate the information needs of others. Second, the plan itself may highlight areas of weakness and point to times when compensation will be necessary.

Execution. During execution members may temporarily assist other members, provide on-line coaching, and anticipate and provide the information needs of other team members. It is important to distinguish between providing needed versus unneeded information as well as supplying appropriate information at the time it is needed.

Indicators of effective performance

- When the BC didn't know the strengths of the company's members he watched their performance.
- When the BC learned a new technique, he passed it on to the team members who could benefit from the new skill.
- The BC's aide provided information to the chief as reminders that an action needed to be taken.
- When an officer didn't do something that he is required to do, the battalion BC pointed out the reasons it is a requirement.

CATEGORY: TEAM DECISION MAKING

Dimension: Envisioning goals

This dimension refers to the extent to which members of the team understand the goal. The three aspects of this dimension are: identifying the goals, ensuring that all members share a common understanding of the goals, and establishing milestones for meeting the goals. In advanced teams, understanding occurs early and continues throughout the operation of the task. When goals shift during task execution, or when one goal takes priority over another, the new goals are communicated to team members.

Planning. When developing a plan for task execution, the team leader must articulate the overall goals making sure that all members of the team understand them.

Execution. When goals are modified, completely abandoned, or one takes priority over another, then these changes must be communicated to and understood by the appropriate team members. Appropriate members include those people whose tasks may be affected by the different goal. In tasks that are characterized by time stress and uncertainty, the continual assessment of the situation allows the leader to know if the goals are being attained.

Methods for envisioning goals. The key to this dimension is the leaders' articulation and the teams' understanding of the goals. Leaders can ensure this understanding by asking the members to repeat the goals.

Indicators of effective performance

- The immediate goal was to develop a size-up of the situation. Obvious problems are dealt with first.
- The team responded with the following order of goals in mind:
 - a) safety of firefighters and occupants (assessed the integrity of the structure and the extent of the fire) (searched for occupants)
 - b) fire extension
 - c) property (avoid excessive property damage)
 - d) leave the community with a good attitude about the fire department
- The first-on-the-scene officer responded with the above goals in mind.
- When someone was unclear about the leader's intent the person sought clarification.

The value of this dimension to team performance. When the whole team understands the goal, all members can operate within common objectives and can improvise within changing conditions of the dynamic situation.

CATEGORY: TEAM DECISION MAKING

Dimension: Assessing the situation

Situation assessment concerns the team's ability to construct a hypothesis about what is actually taking place in their real-world environment. Team members can input information that will allow an accurate situation assessment. The team also must work from a similar perspective of the situation. These assessments must be clearly communicated and understood by all members. Real problems can arise if different team members have different perspectives about what is occurring.

Planning. During planning there are two critical aspects of sharing situation assessment. The first is Divergence. Divergence involves encouraging team members to articulate different perspectives or interpretations about what is happening in the situation. It also involves seeking views from a variety of team members. The second is Convergence. Convergence involves the elimination of perspectives that are unlikely, and agreement on one assessment of the situation. Converging is a process of harnessing various views of the situation to arrive at an assessment that reflects ground truth. Once an assessment is made, it is important for team members to work from a similar assessment. This can be attained through the use of maps, diagrams, messages, and meetings to ensure that team members are viewing the situation similarly.

Execution. During task execution, it is important to form an accurate size-up and to make sure that all members know the assessment. Sharing the situation assessment will make it easier for members to recognize when something is occurring that indicates an inaccurate assessment. These exceptions are then shared with the rest of the team. This permits the team to adjust the situation assessment on line to more closely match ground truth.

Indicators of effective performance

- The following factors were included in the size-up:

Structure:

- Location
- Number of stories
- Occupancy status
- Sprinkler system

Safety:

- If structure is engulfed in flames, the BC does an outside size-up, looking for cracks in structure, parts of the building falling off.

- Frequent status reports were given.

- Type of construction material
- Type of habitat
- Size

Contents of the building:

- Hazardous materials
- rubbish

CATEGORY: TEAM DECISION MAKING

Dimension: Focusing attention on range of factors

This dimension refers to the team's ability to focus its attention on the most relevant cues. It specifically involves the team's awareness of all the factors that must be considered during problem solving and decision making. Focusing on an appropriate range or number of factors is key to advanced team performance. The team should not consider so many that it becomes paralyzed or so few that the solution results in error.

Planning. During the planning stage the team identifies the factors, conditions, or elements that must be considered at the time of the incident and evaluated throughout the incident. Making sure all team members are aware of and understand these factors is an important aspect of this dimension.

Execution. The factors are considered at the time of the incident and are evaluated throughout the incident. When factors different from the ones originally considered are relevant to a specific situation, these must be communicated to the appropriate team members. The factors that must be considered during execution are often in the form of check lists, but not always.

Indicators of effective performance

- The BC did not go inside the building unless he was the first person on the scene. (The danger is that he may acquire the urge to focus on minutiae.)
- The time of day and the day of the week informed the members about the occupancy of the building. (For instance, if it is Saturday, then the possibility of children being home is high. Also on Saturday, people are usually home and there is a greater chance of people being out on the street watching if the building is really on fire. At 1:30pm, people are usually not sleeping, so someone in the house should be awake.)

The value of this dimension to team performance. Firefighters must rely on a great deal of knowledge to accurately size up a situation. They must also consider many factors which change from situation to situation depending upon the nature of the situation. In firefighting, a plan of action can usually fall pretty easily from an accurate size-up. Knowledge of the factors that allow an accurate size-up is important to team performance.

CATEGORY: TEAM DECISION MAKING

Dimension: Focusing attention on time horizon

This dimension refers to the team's ability or skill to look into the future in order to be proactive and stay ahead of the fire. Time horizon involves the team's awareness of two time elements: upcoming events and the amount of time it takes to accomplish an action.

An advanced team:

- will anticipate upcoming events and plan activities accordingly,
- has knowledge of the amount of time it takes to accomplish an action and plans and assigns tasks accordingly, and
- understands lag times to avoid getting behind the timeline.

Time horizon is different from time management. Time horizon deals with reaction time while time management deals with real-time planning.

Planning. During the planning stage, the team will identify and discuss the amount of time it takes to complete an activity, e.g., "remember, it takes 10 minutes to move X." Making sure all team members are aware of and understand these time issues is an important aspect of this dimension.

Execution. During execution, this is evident when the team has failed to anticipate and work with the lag times that often occur during real-world task execution. For example, a team may start doing something when it needs to be done rather than taking into consideration the fact that it will take 10 minutes to have the effect they want right now.

Indicators of effective performance

- The building information was on hand.
- Everyone reacted quickly.
- Information about the layout of the streets was shared with the drivers.
- Members of the team anticipated the amount of time it takes for equipment to arrive.
- The BC anticipated the amount of time it takes for equipment to arrive.

The value of this dimension to team performance. The commander must plan to fight the fire that will be there in 10 minutes rather than fight the fire he sees when just arriving on the scene. Understanding time horizon issues will increase the likelihood that the team will be able to achieve this.

CATEGORY: TEAM DECISION MAKING

Dimension: Managing uncertainty

This dimension refers to the team's ability to recognize and communicate uncertainty about the information that impacts situation assessment. If there is uncertainty about the nature of a situation, then the advanced team actively attempts to clarify the uncertainty, develop plans that are flexible enough to allow rapid shifts in activity as the situation becomes clearer, or hold onto knowledge of the uncertainty until it can be resolved.

Planning. During the planning stage the team may identify what they know and what is still uncertain, and make sure that appropriate members are aware of these gaps in the team's knowledge base. Teams may also assign specific information-gathering tasks to attempt to reduce this uncertainty. During planning, the key to effective performance is to identify the gaps in their knowledge, to make sure appropriate members know where these gaps are, and to anticipate how they might gather this information on line.

Execution. During execution, look for the team to occasionally communicate not only what they see or know but also what they don't know. It should also be possible to see team members remind other team members of uncertainty when appropriate.

Indicators of effective performance

- The BC reviewed the Vital Buildings Information sheet as he was going to an incident in a building that he is unfamiliar with.
- Information was shared about the kind of buildings that surrounded the address.
- Information was shared about what they didn't know about the building.
- Members clarified the location of the incident when they were unsure.
- Because the BC was not up-to-date on latch-key laws, he waited for a police officer to arrive before he broke into the building to get a little boy out. Meanwhile, the ladder officer noticed fire hazards in the building, giving them reason to rescue the boy.

CATEGORY: TEAM SELF MANAGEMENT

Dimension: Monitoring/adjusting

This dimension refers to the team's ability to examine itself for signs of both effective and ineffective teamwork behaviors and change or reward behaviors accordingly. The purpose of monitoring is to recognize how the team is operating and make adjustments. Recognizing effective behaviors increases the team's ability to use them in the future. Recognizing ineffective processes and behaviors and changing them increases the team's performance on line.

Planning. During the planning stage, observations will focus on how the team is monitoring and adjusting team performance within the context of the planning task. During this stage, you can watch the team to see if it is verifying that they have identified and communicated their resources, roles and functions, goals, and uncertainties. Also, the team wants to monitor members' engagement, sharing of situation assessment, compensation. When the team recognizes inefficient team processes, it can adjust them to make them more efficient.

Execution. During execution, the team will monitor their performance within the context of the task they are executing. When there is a recognition of inefficiently performed team processes, or a complete lack of team processes, the team attempts to reinstate these processes, e.g., roles & functions, goals, assessing situation assessment, compensation, etc.

Indicators of effective performance

- When the BC arrived on the scene, an officer told him what they had been doing and what they intended to do. The BC determined if they should continue.
- The BC monitors procedures and gives direction to ensure they are being followed. (For instance, a ladder company was assisting the police on a search for guns atop roof. In an assist police call, the ladder company is not to put their people at risk. In this case, the BC noticed that the firefighter was climbing the ladder and told him that his job was only to usher them, not to do their job for them.)

CATEGORY: TEAM SELF MANAGEMENT

Dimension: Time management

This dimension refers to the team's ability to meet goals before deadlines overtake them. Managing time includes sequencing sub-tasks so that output from one task connects where and when it should as input to the next task and allocating the right amount of time to the most important tasks.

Planning. During the planning stage, time management occurs in two ways. First, managing the time of the planning process itself, keeping the team on schedule so it does not run out of time to accomplish various planning tasks and is ready on time for the execution stage. Second, working on anticipating the time management issues for the execution phase such as attempting to ascertain that they are being realistic about what they need to accomplish in the time available during execution.

Execution. Look for real-time timekeeping. On schedule, off schedule, been at this task X long, etc.

Indicators of effective performance

- BC Aide watched the clock to inform the BC how long people had been looking for the fire. (For instance, if firefighters have been looking for the fire for 15 minutes and no one has found anything, but the smoke is getting thicker, then the Aide will inform the BC of this.)
- The BC Aide watched the clock to time how long people had been inside the burning building and reported this to the BC.

A Model-Based Team Decision-Making and Performance Assessment
Instrument: Development and Evaluation

Handoff and Instructional Package

Volume II

TEAM PERFORMANCE MEASUREMENT PACKAGE

This package contains 4 parts:

PART 1. INTRODUCTION

PART 2. EXPLANATION OF TEAM PERFORMANCE MODEL

PART 3. ASSESSMENT INSTRUMENT

PART 4. ACCOMPANYING MATERIALS (left folder pocket)

- descriptions of incidents
- assessment forms

Please read the Introduction and Parts 2 and 3 before filling out the assessment forms.

Thank you in advance.

PART 1. INTRODUCTION

If a group of highly competent individuals is not enough to guarantee efficient teamwork, what is? We have all been in teams that have performed with varying degrees of efficiency. Sometimes we blame the problems on the nature of the task and sometimes we blame certain individuals on the team. Our belief, however, is that certain processes exist that facilitate the coordination of individual tasks and the achievement of advanced team performance. We also believe that these processes can be enhanced once the team recognizes them. This package has been designed to help people understand and recognize these team processes.

We have developed this package for anyone who is responsible for accomplishing tasks through teamwork. This particular package was designed for Battalion Chiefs in Fire Departments to help them view team performance in ways that were not apparent before. Its purpose is to describe a way of looking at teams to see where they are succeeding and where they could improve. This new team perspective will allow you to develop interventions that will improve team performance. These interventions can be made either during an incident to enhance team performance or during after-incident reviews to emphasize lessons learned.

The model of team performance we have developed is based on findings from five years of studying various teams: helicopter and cockpit crews, firefighting teams suppressing forest fires, Army command and control teams from Battalions, Corps, Divisions, and echelons above the Corps level at the Army War College and the National Defense University.

During our interactions with team members we have asked what they think makes for good team performance. We consistently get two answers: good communication and good coordination. One study with high ranking fire safety officers during an emergency simulation showed that more efficient teams were better in task distribution and coordination. Our goal is to identify the behaviors

and processes that ensure effective communication, coordination, and task distribution.

We have also heard that good team performance is directly related to how well team members get along. But that is not the focus of this effort. We believe that processes like knowledge of the roles and functions that must be fulfilled, understanding of and commitment to the common goal, and an adequate assessment of the situation are more important to effective team performance than the personalities of its members. While this package is not designed to help team members "get along better," it can help the team understand the impact of personality conflicts on the processes of team performance.

Using the assessment instrument contained in this package involves looking at the performance of your team along 14 separate dimensions. To help you learn to apply it, we have provided examples of firefighting incidents in which you were involved. We ask you to examine and rate your team's performance during these incidents on the 14 dimensions. Before you do that, we ask you to read the overview of the four categories of team performance in hopes of helping you learn to view team performance in a more structured way. The four categories make up the model of team performance on which the assessment is based. They are: Team Resources, Team Identity, Team Decision Making, and Team Self Management. These will be explained in greater detail in Part 2 of this package. The ideas contained in this package should not be foreign to you since it was validated by 11 Battalion Chiefs in the Philadelphia Fire Department.

Part 2 of this package provides the overview. Part 3 contains instructions for using the assessment tool. After you have read through Parts 2 and 3, fill out the assessment forms contained in Part 4 in the front pocket of this folder.

PART 2. EXPLANATION OF TEAM PERFORMANCE MODEL

The purpose of this team performance framework is to redirect your attention from focusing solely on individual performance to seeing the coordination efforts of team members. There are four major categories of advanced team performance. They are:

- Team Resources**
- Team Identity**
- Team Decision Making**
- Team Self Management**

In this part we describe the four major categories. Each category is further divided into several dimensions that provide a clearer representation of the category. You'll find these dimensions listed within the category they correspond to.

TEAM RESOURCES

This category includes the resources that are available to the team for getting the job done. Resources include people, equipment, and standard procedures. A team that knows the resources available to

- it and the capabilities of these resources for getting the job done will be in a better position to use the resources appropriately. The team must make sure that the resources available to it and the capabilities of each are communicated to the appropriate team members.

The four dimensions of Team Resources are:

- Member resources**
- Leadership resources**
- Non-human resources**
- Basic procedures**

We believe that if team members are aware of these resources they have a greater chance of taking maximum advantage of them. The next category describes how this can happen.

TEAM IDENTITY

Teams develop a sense of identity. There is a clear shift from individuals who are focused on doing their individual jobs to an integrated team whose members are in tune with what it takes to achieve the collective goals. It is through the development of team identity that good teamwork begins to emerge.

What will strengthen team identity? Members' knowledge of the roles which others are fulfilling and an understanding of how their own role fits in with them. There are a number of ways you can tell the strength of a team's identity or commitment to the common goal. You can tell by watching to see if each member is actively engaged in achieving the team goal. You can also tell by the behaviors of members who are encouraging others to engage. Another way to judge a team's level of identity is by looking at the compensation behaviors that are exhibited. Compensation behaviors include members stepping appropriately out of their own roles and filling another role if the need exists. You can also judge the team's strength of identity by watching to see if members who have greater skills, knowledge, and experience are coaching members who are at a lower level. Another indication of strength is whether or not team members can anticipate the needs of other members and fill those needs during stressful situations without being asked.

The three dimensions of team identity are:

- Defining roles and functions
- Engaging
- Compensating

Firefighters face situations with different task responsibilities and must rely on the knowledge and expertise of other more experienced firefighters. Team identity is about taking maximum advantage of the members' knowledge and experiences and increasing both whenever possible.

TEAM DECISION MAKING

Firefighting situations are made up of many factors that are continually changing (i.e., the nature of fire and the firefighters' impact on the situation as they begin to fight the fire). In situations that are characterized by risk and time pressure it is important for teams to learn how to perceive what it sees on the fireground and to respond effectively. This category points to the processes which allow a team to be highly responsive to changing conditions. Our definition of decision making is broad. It includes assessing the situation, deciding upon a course of action, and monitoring the situation to make sure the course of action is meeting the goals.

The five dimensions that represent this category are:

- Envisioning goals
- Assessing the situation
- Focusing attention on range of factors
- Focusing attention on time horizon
- Managing uncertainty

Teams share common goals, but do they also share a common understanding of the goal? Firefighting teams learn the goals over time as officers watch their company's performance toward those goals and then provide constructive feedback. This is one good strategy for helping the teams envision goals. We will discuss others in the assessment tool.

In order to be responsive in a dynamic environment teams must assess the situation to form a quick and accurate size-up. This search depends on the team's ability to scan a sufficiently broad range of factors to detect important patterns, and to focus its attention far enough into the future to be able to react to events.

Recognizing and managing what isn't known about a situation is also important for improving team responsiveness. For instance, if the integrity of the building has not yet been assessed, but civilians are trapped inside, then it may be necessary to gather more

information about the building before sending someone in. Uncertainty is managed by the assignment of information-gathering tasks and holding back until the uncertainty is clarified.

TEAM SELF MANAGEMENT

The final category of team performance concerns the team's ability to oversee its performance as a team. Team self management is a monitoring and adjustment function. A team needs to monitor what is occurring and note differences from what is expected, so that it can adjust appropriately. In fact, if the team monitors its performance on the three categories just described, Team Resources, Team Identity, and Team Decision Making, and makes adjustments when necessary, the team will advance in its level of teamwork. Adjustments to team performance can occur during task execution and/or after task execution in meetings to discuss the lessons learned.

The dimensions that represent team self management are:

Monitoring/adjusting
Time management

- Each of the four categories just described consist of dimensions that indicate advanced performance. These dimensions are defined in Part 3 of this package.

PART 3. ASSESSMENT INSTRUMENT

INSTRUCTIONS FOR USING THE ASSESSMENT INSTRUMENT

The instrument consists of three parts:

1. Definition of the team performance dimensions.
2. Examples of firefighting incidents you were involved in.
3. Assessment forms for rating team performance.

There are three steps to applying this instrument. First, become familiar with the detailed descriptions of the 14 dimensions of the team performance model. Second, refamiliarize yourself with the firefighting incidents (left folder pocket). Note that these are incidents you were involved in when we rode with you in May, 1994. Attached to each incident is a set of assessment forms. The third step is to assess each incident along the 14 dimensions. The next paragraph provides more detailed instructions.

In the left folder pocket you will find packets of papers stapled together. The first page is a description of the incident in which you were involved. The remaining pages, which are attached to each

- incident, make up a set of assessment forms. You will use these assessment forms to rate your team's performance.

Before you rate the incident for performance on a particular dimension, please read the definition of the dimension and make sure you understand it. The definitions of each of the 14 dimensions are listed next. With each definition, we have included examples of behaviors to help clarify the meaning of each dimension. Our intent for listing the behaviors is merely to clarify. They are not intended to be comprehensive. That is, you may think of examples of behaviors not included in the list.

Our definitions include what team performance might look like during a planning session and what it might look like during task execution. It takes coordinated team effort to develop a plan for approaching a task or a project just as it does to execute a task. For instance, when you fill out a Vital Building Information form on a high-rise building, you will consult with others to make sure you include all pertinent data and create appropriate approaches to the fire. The team performance dimensions are as important during planning as they are during task execution, but it takes a slightly different orientation to recognize the team performance behaviors. Within the description of the behavioral dimensions, we explain the behaviors for planning and for execution.

As you read about and understand the meaning of a dimension, please rate the incident using the corresponding assessment form for that dimension.

Reminder: Call Molly or Marv (513-873-8166) if you need any further clarification.

DEFINITIONS OF DIMENSIONS

See the following 14 pages.

CATEGORY: TEAM RESOURCES

Dimension: Member resources

This dimension refers to the team's understanding of its members' capabilities. Capabilities include the skills, knowledge, mental and physical abilities, experiences, and personalities. What is critical to team performance is not so much knowing how "good" the individuals are, but knowing what resources the team has to work with. By having a good understanding of the member resources, the team will be better able to match these resources to the demands of the task.

Planning. When planning who will do a particular task, the team should assess members' strengths and weaknesses and make sure all members understand what is available. All members should know who brings what strengths.

Execution. Before executing a task, the team should try to gain an understanding of its member resources. You'll see this dimension during task execution if members are monitoring the on-going status of team members and making appropriate adjustments in the event of fatigue, injuries, or inability to do the job.

Indicators of effective performance in the firefighting domain.

- BC ascertains who is in each company during a given shift prior to an incident.
- BC ascertains the competence level of individuals in the battalion.
- BC listens to the radio and knows which companies are responding to the incident.
- BC ascertains who can and who cannot handle an incident. This includes the ladder and engine companies, the medics, and the officers.

The value of this dimension to team performance. One Battalion Chief was called to a fire across town. On his way there, the engine company officer placed it under control. The Battalion Chief believed the officer put it under control because he knew it was a long way for the Battalion Chief to go; he was not yet completely confident in this officer's skills. The Battalion Chief ended up going anyway and spent an hour on the fireground. The Battalion Chief's knowledge of the way this officer worked increased the operating efficiency of the team.

Methods for learning about team members. The capabilities of members can be assessed through observations, informal discussions, interviews, education records, and resumes. You may also employ more formal assessment methods such as psychometric, intelligence, or skills tests.

CATEGORY: TEAM RESOURCES

Dimension: Leadership resources

This dimension is about team members' knowledge of their leaders' capabilities and preferences.

Planning. The team should discuss the strengths and limitations in its leadership resources and be clear about its leadership needs.

Execution. Before executing a task the team should have knowledge of who the leaders are and an understanding of how they will operate. If modifications to leadership are made during execution, the changes need to be communicated to the whole team.

Indicators of effective performance

- BC understands what the officers in each company can and cannot handle.
- BC determines who is in each company during a given shift.
- If the officer of the ladder or engine company arrives on the scene before the BC, all are clear about who has leadership responsibility until the BC arrives.
- When the BC arrives, he receives viable information and then takes command.
- When the Deputy Chief arrives, he slowly eases himself into the command position. Taking over immediately may disrupt execution of the firefight.

The value of this dimension to team performance. This dimension is not about the strength or the style of the leader. Instead, it is about the team's knowledge of the leader's strength and style. Knowing this allows the team to work within a particular style. Leadership functions must be performed. If one leader is incapable, unwilling, or too busy to fulfill the functions, then these functions must be distributed.

Methods for learning about leadership. Leadership resources can be assessed through observation and discussion, or through formal methods such as leadership profiles and interviews. Firefighters should be encouraged to get to know their leaders.

CATEGORY: TEAM RESOURCES

Dimension: Non-human resources

This dimension refers to the equipment, apparatus, tools, supplies, vehicles, and computers/software that are available to the team to get the job done. The key to this dimension is the knowledge members have about what's available, its capabilities, and how it operates.

Planning. When making plans to execute a task, the team should verify what resources are available to them, and identify weaknesses and strengths. This information is communicated to the whole team. If resources are added, then the team needs to know about them.

Execution. The team's understanding of the resources available to them should be ascertained prior to task execution. You will see this dimension when changes to resources occur during execution. These changes need to be communicated to the whole team.

Indicators of effective performance.

- BC checks the dispatch notification sheet to find out what equipment he will have available to work with on the scene. This is referred to as the *company rundown*.
- Each team member knows what equipment will be arriving at a given incident.
- Each team member knows which resources are carried in the various vehicles.

The value of this dimension to team performance. Knowing the resources that are available to the team allows members to take steps to maximize their use. Conversely, knowing what it doesn't have to work with allows the team to work around the absence. For example, if Rescue One is not available to respond to a job, then the plan of action must include resources to cover the work usually performed by Rescue One.

CATEGORY: TEAM RESOURCES

Dimension: Basic Procedures

This dimension refers to the standard procedures that are in place to provide basic direction and processes for the team members. Procedures are developed to guide the team to more efficient and effective operation. Procedures are enacted by team members through a series of coordinated activities. Team members must be aware of these procedures and how they are implemented. The smoothness with which procedures are implemented indicates the team's familiarity with its basic procedures. Familiarity is gained through both study and practice.

Planning. The team may rely on procedures during planning sessions to direct their activities. Developing procedures that will be used during task execution is different from implementing the procedures. Basic procedures should be established in advance of task execution and task execution will uncover needed changes or additions to standard procedures. During the planning stage we should see the team verify these procedures, communicate them to the team members, and incorporate procedures into the planning process.

Execution. Characteristics of the situation will inform the team about which procedure should be implemented. The characteristics and the subsequent procedure are established prior to task execution. During task execution a well-informed observer can watch to see if team members are implementing procedures appropriately. If a procedure is no longer appropriate for the characteristics of the task and it is altered or discarded, then these changes must be communicated to the whole team.

Indicators of effective performance

- When the team responded to an *Assist Police* call, all sirens were cut 4 blocks away from the scene.
- When a *Tactical Box* call went out, two engines, two ladders, and one BC responded.
- When a *Full Box* alarm went out, four engines, two ladders, and two BCs responded.
- The first arriving engine took the front, the second engine took the rear, the third engine took the front, and the fourth engine took the rear. The first arriving ladder took the front, the second ladder took the rear. The first arriving BC took the front, the second arriving BC took the rear.
- When nothing was showing, the first arriving BC called for reduced speed of incoming engines.
- The first arriving officer assumed leadership responsibility until a higher ranking officer arrived.

CATEGORY: TEAM IDENTITY

Dimension: Defining roles and functions

This behavioral dimension refers to the articulation and understanding of the task responsibilities, functions, and roles of every other member. Once roles and functions are understood, the team can take advantage of the individual power available to it. Use of this behavioral dimension will facilitate coordination efforts.

Planning. You can observe this dimension during planning tasks by watching to see if team members are clarifying their roles and functions and making sure that everyone understands them. Roles and functions are made explicit.

Execution. Much of the team's understanding of their roles and functions should be achieved prior to task execution. If the team is required to make changes in roles and functions on line, then these changes must be communicated to the whole team.

Indicators of effective performance.

- When alarms greater than a tactical box are called, the BCs discuss the roles they will take.
- BCs reminded firefighters about their role in an *assist police* call. That is, firefighters provide the means for the police to do their job and do not get involved in the incident. This prevents firefighters from getting near evidence and from getting into situations they are not qualified to handle.
- Medics let firefighters know what functions they can serve in a car accident situation.
- It is well known that the BC Aide will serve as a time keeper to keep track of how long people have been inside a structure.

CATEGORY: TEAM IDENTITY

Dimension: Engaging

This behavioral dimension represents the extent to which the team members **participate and encourage others to participate** in the team's work and take responsibility for reaching the team goals.

Planning and Execution behaviors look similar.

Indicators of effective performance.

- When an officer is handling a situation, the BC does not take over the situation unless it is necessary. If he does take over, it may discourage the officer from taking responsibility.

CATEGORY: TEAM IDENTITY

Dimension: Compensating

This dimension refers to the movement of team resources to cover areas where the team cannot satisfy its roles, functions, and responsibilities. Compensation involves three team actions: covering for others, coaching, and anticipation.

Covering for others involves team members stepping appropriately outside of, or adding to, their assigned team roles or functions in order to help the team reach its goals.

Coaching occurs when a team member helps another team member achieve a greater level of individual proficiency. The entire team benefits from coaching because the team moves up to a more advanced level of performance by improving the capabilities of its members.

Anticipation involves anticipating the information needs of members who have become overloaded by uncertain conditions and time constraints. It also involves members offering information and help to reduce the burden of overloaded members.

Planning. Compensating is evident in two ways during planning. First, to develop a plan, members of the team carry out specific roles and functions. During planning tasks you can watch members cover for others, coach others, and anticipate the information needs of others. Second, the plan itself may highlight areas of weakness and point to times when compensation will be necessary.

Execution. During execution members may temporarily assist other members, provide on-line coaching, and anticipate and provide the information needs of other team members. It is important to distinguish between providing needed versus unneeded information as well as supplying appropriate information at the time it is needed.

Indicators of effective performance.

- When the BC didn't know the strengths of the company's members he watched their performance.
- When the BC learned a new technique, he passed it on to the team members who could benefit from the new skill.
- The BC's aide provided information to the chief as reminders that an action needed to be taken.
- When an officer didn't do something that he is required to do, the BC pointed out the reasons it is a requirement.

CATEGORY: TEAM DECISION MAKING

Dimension: Envisioning goals

This dimension refers to the extent to which members of the team understand the goal. The three aspects of this dimension are: identifying the goals, ensuring that all members share a common understanding of the goals, and establishing milestones for meeting the goals. In advanced teams, understanding occurs early and continues throughout the operation of the task. When goals shift during task execution, or when one goal takes priority over another, the new goals are communicated to team members.

Planning. When developing a plan for task execution, the team leader must articulate the overall goals making sure that all members of the team understand them.

Execution. When goals are modified, completely abandoned, or one takes priority over another, then these changes must be communicated to and understood by the appropriate team members. Appropriate members include those people whose tasks may be affected by the different goal. In tasks that are characterized by time stress and uncertainty, the continual assessment of the situation allows the leader to know if the goals are being attained.

Methods for envisioning goals. The key to this dimension is the leaders' articulation and the teams' understanding of the goals. Leaders can ensure this understanding by asking the members to repeat the goals.

Indicators of effective performance

- The immediate goal was to develop a size-up of the situation. Obvious problems are dealt with first.
- The team responded with the following order of goals in mind:
 - a) safety of firefighters and occupants (assessed the integrity of the structure and the extent of the fire) (searched for occupants)
 - b) fire extension
 - c) property (avoid excessive property damage)
 - d) leave the community with a good attitude about the fire department
- The first-on-the-scene officer responded with the above goals in mind.
- When someone was unclear about the leader's intent the person sought clarification.

The value of this dimension to team performance. When the whole team understands the goal, all members can operate within common objectives and can improvise within changing conditions of the dynamic situation.

CATEGORY: TEAM DECISION MAKING

Dimension: Assessing the situation

Situation assessment concerns the team's ability to construct a hypothesis about what is actually taking place in their real-world environment. Team members can input information that will allow an accurate situation assessment. The team also must work from a similar perspective of the situation. These assessments must be clearly communicated and understood by all members. Real problems can arise if different team members have different perspectives about what is occurring.

Planning. During planning there are two critical aspects of sharing situation assessment. The first is Divergence. Divergence involves encouraging team members to articulate different perspectives or interpretations about what is happening in the situation. It also involves seeking views from a variety of team members. The second is Convergence. Convergence involves the elimination of perspectives that are unlikely, and agreement on one assessment of the situation. Converging is a process of harnessing various views of the situation to arrive at an assessment that reflects ground truth. Once an assessment is made, it is important for team members to work from a similar assessment. This can be attained through the use of maps, diagrams, messages, and meetings to ensure that team members are viewing the situation similarly.

Execution. During task execution, it is important to form an accurate size-up and to make sure that all members know the assessment. Sharing the situation assessment will make it easier for members to recognize when something is occurring that indicates an inaccurate assessment. These exceptions are then shared with the rest of the team. This permits the team to adjust the situation assessment on line to more closely match ground truth.

Indicators of effective performance

- The following factors were included in the size-up:

Structure:

- Location
- Number of stories
- Occupancy status
- Sprinkler system

Safety:

- If structure is engulfed in flames, the BC does an outside size-up, looking for cracks in structure, parts of the building falling off.

Type of construction material

- Type of habitat
- Size

Contents of the building:

- Hazardous materials
- rubbish

- Frequent status reports were given.

CATEGORY: TEAM DECISION MAKING

Dimension: Focusing attention on range of factors

This dimension refers to the team's ability to focus its attention on the most relevant cues. It specifically involves the team's awareness of all the factors that must be considered during problem solving and decision making. Focusing on an appropriate range or number of factors is key to advanced team performance. The team should not consider so many that it becomes paralyzed or so few that the solution results in error.

Planning. During the planning stage the team identifies the factors, conditions, or elements that must be considered at the time of the incident and evaluated throughout the incident. Making sure all team members are aware of and understand these factors is an important aspect of this dimension.

Execution. The factors are considered at the time of the incident and are evaluated throughout the incident. When factors different from the ones originally considered are relevant to a specific situation, these must be communicated to the appropriate team members. The factors that must be considered during execution are often in the form of check lists, but not always.

Indicators of effective performance

- The BC did not go inside the building unless he was the first person on the scene. (The danger is that he may acquire the urge to focus on minutiae.)
- The time of day and the day of the week informed the members about the occupancy of the building. (For instance, if it is Saturday, then the possibility of children being home is high. Also on Saturday, people are usually home and there is a greater chance of people being out on the street watching if the building is really on fire. At 1:30pm, people are usually not sleeping, so someone in the house should be awake.)

The value of this dimension to team performance. Firefighters must rely on a great deal of knowledge to accurately size up a situation. They must also consider many factors which change from situation to situation depending upon the nature of the situation. In firefighting, a plan of action can usually fall pretty easily from an accurate size-up. Knowledge of the factors that allow an accurate size-up is important to team performance.

CATEGORY: TEAM DECISION MAKING

Dimension: Focusing attention on time horizon

This dimension refers to the team's ability or skill to look into the future in order to be proactive and stay ahead of the fire. Time horizon involves the team's awareness of two time elements: upcoming events and the amount of time it takes to accomplish an action.

An advanced team:

- will anticipate upcoming events and plan activities accordingly,
- has knowledge of the amount of time it takes to accomplish an action and plans and assigns tasks accordingly, and
- understands lag times to avoid getting behind the timeline.

Time horizon is different from time management. Time horizon deals with reaction time while time management deals with real-time planning.

Planning. During the planning stage, the team will identify and discuss the amount of time it takes to complete an activity, e.g., "remember, it takes 10 minutes to move X." Making sure all team members are aware of and understand these time issues is an important aspect of this dimension.

Execution. During execution, this is evident when the team has failed to anticipate and work with the lag times that often occur during real-world task execution. For example, a team may start doing something when it needs to be done rather than taking into consideration the fact that it will take 10 minutes to have the effect they want right now.

Indicators of effective performance.

- The building information was on hand.
- Everyone reacted quickly.
- Information about the layout of the streets was shared with the drivers.
- Members of the team anticipated the amount of time it takes for equipment to arrive.
- The BC anticipated the amount of time it takes for equipment to arrive.

The value of this dimension to team performance. The commander must plan to fight the fire that will be there in 10 minutes rather than fight the fire he sees when just arriving on the scene. Understanding time horizon issues will increase the likelihood that the team will be able to achieve this.

CATEGORY: TEAM DECISION MAKING

Dimension: Managing uncertainty

This dimension refers to the team's ability to recognize and communicate uncertainty about the information that impacts situation assessment. If there is uncertainty about the nature of a situation, then the advanced team actively attempts to clarify the uncertainty, develop plans that are flexible enough to allow rapid shifts in activity as the situation becomes clearer, or hold onto knowledge of the uncertainty until it can be resolved.

Planning. During the planning stage the team may identify what they know and what is still uncertain, and make sure that appropriate members are aware of these gaps in the team's knowledge base. Teams may also assign specific information-gathering tasks to attempt to reduce this uncertainty. During planning, the key to effective performance is to identify the gaps in their knowledge, to make sure appropriate members know where these gaps are, and to anticipate how they might gather this information on line.

Execution. During execution, look for the team to occasionally communicate not only what they see or know but also what they don't know. It should also be possible to see team members remind other team members of uncertainty when appropriate.

Indicators of effective performance

- The BC reviewed the Vital Buildings Information sheet as he was going to an incident in a building that he is unfamiliar with.
- Information was shared about the kind of buildings that surrounded the address.
- Information was shared about what they didn't know about the building.
- Members clarified the location of the incident when they were unsure.
- Because the BC was not up-to-date on latch-key laws, he waited for a police officer to arrive before he broke into the building to get a little boy out. Meanwhile, the ladder officer noticed fire hazards in the building, giving them reason to rescue the boy.

CATEGORY: TEAM SELF MANAGEMENT

Dimension: Monitoring/adjusting

This dimension refers to the team's ability to examine itself for signs of both effective and ineffective teamwork behaviors and change or reward behaviors accordingly. The purpose of monitoring is to recognize how the team is operating and make adjustments. Recognizing effective behaviors increases the team's ability to use them in the future. Recognizing ineffective processes and behaviors and changing them increases the team's performance on line.

Planning. During the planning stage, observations will focus on how the team is monitoring and adjusting team performance within the context of the planning task. During this stage, you can watch the team to see if it is verifying that they have identified and communicated their resources, roles and functions, goals, and uncertainties. Also, the team wants to monitor members' engagement, sharing of situation assessment, compensation. When the team recognizes inefficient team processes, it can adjust them to make them more efficient.

Execution. During execution, the team will monitor their performance within the context of the task they are executing. When there is a recognition of inefficiently performed team processes, or a complete lack of team processes, the team attempts to reinstate these processes, e.g., roles & functions, goals, assessing situation assessment, compensation, etc.

Indicators of effective performance.

- When the BC arrived on the scene, an officer told him what they had been doing and what they intended to do. The BC determined if they should continue.
- The BC monitors procedures and gives direction to ensure they are being followed. (For instance, a ladder company was assisting the police on a search for guns atop roof. In an *assist police* call, the ladder company is not to put their people at risk. In this case, the BC noticed that the firefighter was climbing the ladder and told him that his job was only to usher them, not to do their job for them.)

CATEGORY: TEAM SELF MANAGEMENT

Dimension: Time management

This dimension refers to the team's ability to meet goals before deadlines overtake them. Managing time includes sequencing sub-tasks so that output from one task connects where and when it should as input to the next task and allocating the right amount of time to the most important tasks.

Planning. During the planning stage, time management occurs in two ways. First, managing the time of the planning process itself, keeping the team on schedule so it does not run out of time to accomplish various planning tasks and is ready on time for the execution stage. Second, working on anticipating the time management issues for the execution phase such as attempting to ascertain that they are being realistic about what they need to accomplish in the time available during execution.

Execution. Look for real-time timekeeping. On schedule, off schedule, been at this task X long, etc.

Indicators of effective performance.

- BC Aide watched the clock to inform the BC how long people had been looking for the fire. (For instance, if firefighters have been looking for the fire for 15 minutes and no one has found anything, but the smoke is getting thicker, then the Aide will inform the BC of this.)
- The BC Aide watched the clock to time how long people had been inside the burning building and reported this to the BC.

ASSESSMENT FORM FOR OVERALL TEAM PERFORMANCE

(The team consists of all the people who responded to this incident.)

Please rate the overall performance of this team during this incident (circle one).

1
Ineffective

2

3
Adequate

4

5
Highly effective

Please circle the statement (1,2, or 3 below) that most closely describes this team's performance:

1. This team could perform competently during even the most difficult incidents.
2. This team needs to improve some of its teamwork processes in order to deal with more difficult incidents.
3. This team would need to make significant changes to its teamwork processes in order to deal with more difficult incidents.

The team processes I would like to see this team improve on for this incident are (please list below):

What interventions would you recommend to improve this team's performance (please list below)?

ASSESSMENT FORM FOR TEAM MANAGEMENT

Please check each dimension as present or not present for this particular incident:

MONITORING/ADJUSTING

1. Present (Check one of the following two categories):

- I observed behaviors during this incident that would indicate performance on this dimension. What were they?

- This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

| | | | | |
|-----------------------------------|---|-----------------|---|-------------------------|
| 1 (Needs a lot of improvement) | 2 | 3 (Adequate) | 4 | 5 (Highly effective) |
|-----------------------------------|---|-----------------|---|-------------------------|

TIME MANAGEMENT

1. Present (Check one of the following two categories):

- I observed behaviors during this incident that would indicate performance on this dimension. What were they?

- This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

| | | | | |
|-----------------------------------|---|-----------------|---|-------------------------|
| 1 (Needs a lot of improvement) | 2 | 3 (Adequate) | 4 | 5 (Highly effective) |
|-----------------------------------|---|-----------------|---|-------------------------|

ASSESSMENT FORM FOR TEAM RESOURCES

Please check each dimension as present or not present for this particular incident:

MEMBER RESOURCES

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they?

This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

| | | | | |
|-----------------------------------|---|-----------------|---|-------------------------|
| 1 (Needs a lot of improvement) | 2 | 3 (Adequate) | 4 | 5 (Highly effective) |
|-----------------------------------|---|-----------------|---|-------------------------|

LEADER RESOURCES

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they?

This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

| | | | | |
|-----------------------------------|---|-----------------|---|-------------------------|
| 1 (Needs a lot of improvement) | 2 | 3 (Adequate) | 4 | 5 (Highly effective) |
|-----------------------------------|---|-----------------|---|-------------------------|

ASSESSMENT FORM FOR TEAM RESOURCES

Please check each dimension as present or not present for this particular incident:

NON-HUMAN RESOURCES

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they?

This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

| | | | | |
|-----------------------------------|---|-----------------|---|-------------------------|
| 1 (Needs a lot of improvement) | 2 | 3 (Adequate) | 4 | 5 (Highly effective) |
|-----------------------------------|---|-----------------|---|-------------------------|

BASIC PROCEDURES

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they?

This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

| | | | | |
|-----------------------------------|---|-----------------|---|-------------------------|
| 1 (Needs a lot of improvement) | 2 | 3 (Adequate) | 4 | 5 (Highly effective) |
|-----------------------------------|---|-----------------|---|-------------------------|

ASSESSMENT FORM FOR TEAM IDENTITY

Please check each dimension as present or not present for this particular incident:

DEFINING ROLES AND FUNCTIONS

1. Present (Check one of the following two categories):

- I observed behaviors during this incident that would indicate performance on this dimension. What were they?

- This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

1 2 3 4 5
(Needs a lot of improvement) (Adequate) (Highly effective)

ENGAGING

1. Present (Check one of the following two categories):

- I observed behaviors during this incident that would indicate performance on this dimension. What were they?

- This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

1 2 3 4 5
(Needs a lot of improvement) (Adequate) (Highly effective)

ASSESSMENT FORM FOR TEAM IDENTITY

Please check each dimension as present or not present for this particular incident:

COMPENSATING

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they?

This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

| | | | | |
|-----------------------------------|---|-----------------|---|-------------------------|
| 1 (Needs a lot of improvement) | 2 | 3 (Adequate) | 4 | 5 (Highly effective) |
|-----------------------------------|---|-----------------|---|-------------------------|

ASSESSMENT FORM FOR TEAM DECISION MAKING

Please check each dimension as present or not present for this particular incident:

ENVISIONING GOALS

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they?

This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

1 2 3 4 5
(Needs a lot of improvement) (Adequate) (Highly effective)

ASSESSING THE SITUATION

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they?

This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

1 2 3 4 5
(Needs a lot of improvement) (Adequate) (Highly effective)

ASSESSMENT FORM FOR TEAM DECISION MAKING

Please check each dimension as present or not present for this particular incident:

FOCUSING ATTENTION ON RANGE OF FACTORS

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they? _____

This dimension was taken into account prior to task execution. How? _____

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident? _____

Rate your team's performance on this dimension for this incident (Circle one):

1
(Needs a lot of improvement)

2

3
(Adequate)

4

5
(Highly effective)

FOCUSING ATTENTION ON TIME HORIZON

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they? _____

This dimension was taken into account prior to task execution. How? _____

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident? _____

Rate your team's performance on this dimension for this incident (Circle one):

1
(Needs a lot of improvement)

2

3
(Adequate)

4

5
(Highly effective)

ASSESSMENT FORM FOR TEAM DECISION MAKING

Please check each dimension as present or not present for this particular incident:

MANAGING UNCERTAINTY

1. Present (Check one of the following two categories):

I observed behaviors during this incident that would indicate performance on this dimension. What were they?

This dimension was taken into account prior to task execution. How?

2. Not Present: I did not observe behaviors during this incident or any other time that would indicate performance on this dimension.

How was this dimension important to your team's performance for this incident?

Rate your team's performance on this dimension for this incident (Circle one):

| | | | | |
|-----------------------------------|---|-----------------|---|-------------------------|
| 1 (Needs a lot of improvement) | 2 | 3 (Adequate) | 4 | 5 (Highly effective) |
|-----------------------------------|---|-----------------|---|-------------------------|

ASSESSMENT FORM FOR OVERALL TEAM PERFORMANCE

(The team consists of all the people who responded to this incident.)

Please rate the overall performance of this team during this incident (circle one).

1 2 3 4 5
Ineffective **Adequate** **Highly effective**

Please circle the statement (1,2, or 3 below) that most closely describes this team's performance:

1. This team could perform competently during even the most difficult incidents.
 2. This team needs to improve some of its teamwork processes in order to deal with more difficult incidents.
 3. This team would need to make significant changes to its teamwork processes in order to deal with more difficult incidents.

The team processes I would like to see this team improve on for this incident are (please list below):

What interventions would you recommend to improve this team's performance (please list below)?

Evaluation Form
Please rate the usefulness of this instructional package

We are interested in what you think about this package. The instructional package and the assessment instrument that you have just completed are still in draft format. We are relying on your feedback to enhance the package to meet the needs of firefighters. As you were using the assessment instrument you probably had some reactions to its language and its usefulness. We are interested in what those reactions were. Please answer the questions below, being as explicit as possible.

This package helped me:

(circle one for each--use the back if you need more room to explain):

Understand team
performance.
Please explain.

Yes

No

Somewhat

Improve my team's
performance on line.
Please explain.

Yes

No

Somewhat

Conduct lessons-learned
sessions.
Please explain.

Yes

No

Somewhat

Convey team performance
concepts to firefighters.
Please explain.

Yes

No

Somewhat

Please rate the language of this instructional package (circle one)

1. Appropriate for firefighters 2. Not appropriate for firefighters

Please explain.